Fisher® FIELDVUE™ DVC6200 Digital Valve Controller

This manual applies to

Instrument Level	HC, AD, PD, ODV	AC
Device Type	03	07
Device Revision	2	2
Hardware Revision	1	1
Firmware Revision	9 & 10	9 & 10
DD Revision	3	1

W9713

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The FIELDVUE DVC6200 Digital Valve Controller is a core component of the PlantWeb™ digital plant architecture. The digital valve controller powers PlantWeb by capturing and delivering valve diagnostic data. Coupled with ValveLink™ software, the DVC6200 provides users with an accurate picture of valve performance, including actual stem position, instrument input signal, and pneumatic pressure to the actuator. Using this information, the digital valve controller diagnoses not only itself, but also the valve and actuator to which it is mounted.

Section 1 Introduction

Scope of Manual

This instruction manual includes specifications, installation, operating, and maintenance information for the FIELDVUE DVC6200 digital valve controller, device revision 2, firmware revision 9 and 10, instrument level AC, HC, AD, PD, and ODV.

Note

Firmware 9 or 10 is required for the DVC6200 digital valve controller. A printed wiring board with earlier versions of firmware must be updated before using with the DVC6200.

Note

All references to the DVC6200 digital valve controller include the DVC6205 base unit unless otherwise indicated.

This instruction manual describes using the 475 Field Communicator with device description revisions 1 and 2 to setup and calibrate the instrument. You can also use Fisher ValveLink software version 10.2 or higher to setup, calibrate, and diagnose the valve and instrument. For information on using ValveLink software with the instrument refer to ValveLink software help or documentation.

Do not install, operate, or maintain a DVC6200 digital valve controller without being fully trained and qualified in valve, actuator, and accessory installation, operation, and maintenance. To avoid personal injury or property damage, it is important to carefully read, understand, and follow all of the contents of this manual, including all safety cautions and warnings. If you have any questions about these instructions, contact your Emerson Process Management sales office before proceeding.

Conventions Used in this Manual

Navigation paths and fast-key sequences are included for procedures and parameters that can be accessed using the Field Communicator.

For example, to access Setup Wizard:

Field Communicator	Configure / Setup > Basic Setup > Setup Wizard (1-1-1)

The Field Communicator menu trees are shown at the beginning of this manual.

Note

475 Field Communicator menu sequences used in this manual are for instrument level HC, AD, PD, and ODV. Refer to the AC menu tree in Appendix C for AC menu sequences.

Description

DVC6200 digital valve controllers (figures 1-1 and 1-2) are communicating, microprocessor-based current-to-pneumatic instruments. In addition to the normal function of converting an input current signal to a

pneumatic output pressure, the DVC6200 digital valve controller, using the HART® communications protocol, gives easy access to information critical to process operation. You can gain information from the principal component of the process, the control valve itself, using the Field Communicator at the valve, or at a field junction box, or by using a personal computer or operator's console within the control room.

Using a personal computer and ValveLink software or AMS Suite: Intelligent Device Manager, or a Field Communicator, you can perform several operations with the DVC6200 digital valve controller. You can obtain general information concerning software revision level, messages, tag, descriptor, and date.

Figure 1-1. FIELDVUE DVC6200 Digital Valve Controller Mounted on a Fisher Sliding-Stem Valve Actuator

W9643

Figure 1-2. FIELDVUE DVC6200 Digital Valve Controller Integrally Mounted to a Fisher GX Control Valve

W9616

Diagnostic information is available to aid you when troubleshooting. Input and output configuration parameters can be set, and the digital valve controller can be calibrated. Refer to table 1-1 for details on the capabilities of each diagnostic tier.

Table 1-1. Instrument Level Capabilities

CAPABILITY	DIAGNOSTIC LEVEL				
	AC	HC	AD	PD	ODV
Auto Calibration	X	X	X	X	X
Custom Characterization	X	X	X	X	X
Burst Communication		X	X	X	X
Alerts		X	X	X	X
Step Response, Drive Signal Test & Dynamic Error Band			X	X	X
Advanced Diagnostics (Valve Signature)			X	X	X
Performance Tuner			X	X	X
Travel Control - Pressure Fallback			X	X	X
Supply Pressure Sensor			X	X	X
Performance Diagnostics				X	X
Solenoid Valve Testing					X
Lead/Lag Input Filter(1)					X

1. Refer to brochure part # D351146X012/D351146X412 for information on Fisher optimized digital valves for compressor antisurge applications.

Using the HART protocol, information from the field can be integrated into control systems or be received on a single loop basis.

The DVC6200 digital valve controller is designed to directly replace standard pneumatic and electro-pneumatic valve mounted positioners.

Specifications

⚠ WARNING

Refer to table 1-2 for specifications. Incorrect configuration of a positioning instrument could result in the malfunction of the product, property damage or personal injury.

Specifications for DVC6200 digital valve controllers are shown in table 1-2. Specifications for the Field Communicator can be found in the product manual for the Field Communicator.

Related Documents

This section lists other documents containing information related to the DVC6200 digital valve controller. These documents include:

- Bulletin 62.1:DVC6200 - Fisher FIELDVUE DVC6200 Digital Valve Controller (D103415X012)
- Bulletin 62.1:DVC6200 HC - Fisher FIELDVUE DVC6200 Digital Valve Controller (D103423X012)
- Bulletin 62.1:DVC6200(S1) Fisher FIELDVUE DVC6200 Digital Valve Controller Dimensions (D103543X012)
- Fisher FIELDVUE DVC6200 Digital Valve Controller Quick Start Guide (D103410X012)
- FIELDVUE Digital Valve Controller Split Ranging - Supplement to HART Communicating Fisher FIELDVUE Digital Valve Controller Instruction Manuals (D103262X012)

- Using FIELDVUE Instruments with the Smart HART Loop Interface and Monitor (HIM) - Supplement to HART Communicating Fisher FIELDVUE Instrument Instruction Manuals (D103263X012)
- Using FIELDVUE Instruments with the Smart Wireless THUM™ Adapter and a HART Interface Module (HIM) - Supplement to HART Communicating Fisher FIELDVUE Instrument Instruction Manuals
- Audio Monitor for HART Communications - Supplement to HART Communicating Fisher FIELDVUE Instrument Instruction Manuals (D103265X012)
- HART Field Device Specification - Supplement to HART Communicating FIELDVUE Instrument Instruction Manuals (D103266X012)
- Using the HART Tri-Loop HART-to-Analog Signal Converter with FIELDVUE Digital Valve Controllers - Supplement to HART Communicating FIELDVUE Instrument Instruction Manuals (D103267X012)
- Lock-in-Last Strategy - Supplement to Fisher FIELDVUE DVC6000 or DVC6200 Digital Valve Controller Instruction Manual (D103261X012)
- Fisher HF340 Filter Instruction Manual (D102796X012)
- 475 Field Communicator User's Manual
- ValveLink Software Help or Documentation

All documents are available from your Emerson Process Management sales office. Also visit our website at www.FIELDVUE.com.

Educational Services

For information on available courses for the DVC6200 digital valve controller, as well as a variety of other products, contact:

Emerson Process Management
Educational Services, Registration
P.O. Box 190; 301 S. 1st Ave.
Marshalltown, IA 50158-2823
Phone: 800-338-8158 or
Phone: 641-754-3771
FAX: 641-754-3431
e-mail: education@emerson.com

Table 1-2. Specifications

Available Mounting

DVC6200 digital valve controller or DVC6215 feedback unit: ■ Integral mounting to the Fisher GX Control Valve and Actuator System ■ Window mounting to Fisher rotary actuators ■ Sliding-stem linear applications ■ Quarter-turn rotary applications

DVC6205 base unit for 2 inch pipestand or wall mounting (for remote-mount)

The DVC6200 digital valve controller or DVC6215 feedback unit can also be mounted on other actuators that comply with IEC 60534-6-1, IEC 60534-6-2, VDI/VDE 3845 and NAMUR mounting standards.

Input Signal

Point-to-Point:
Analog Input Signal: 4-20 mA DC, nominal; split ranging available
Minimum Voltage Available at Instrument Terminals must be 10.5 VDC for analog control, 11 VDC for HART communication
Minimum Control Current: 4.0 mA
Minimum Current w/o Microprocessor Restart: 3.5 mA
Maximum Voltage: 30 VDC
Overcurrent protected
Reverse Polarity protected

Multi-drop:
Instrument Power: 11 to 30 VDC at 8 mA
Reverse Polarity protected

Output Signal

Pneumatic signal, up to 95% of supply pressure
Minimum Span: 0.4 bar (6 psig)
Maximum Span: 9.5 bar (140 psig)
Action: ■ Double, ■ Single Direct or ■ Reverse

Supply Pressure(1)

Minimum Recommended: 0.3 bar (5 psig) higher than maximum actuator requirements
Maximum: 10.0 bar (145 psig) or maximum pressure rating of the actuator, whichever is lower
Medium: Air or natural gas

Air: Supply pressure must be clean, dry air that meets the requirements of ISA Standard 7.0.01. A maximum 40 micrometer particle size in the air system is acceptable. Further filtration down to 5 micrometer particle size is recommended. Lubricant content is not to exceed 1 ppm weight (w/w) or volume (v/v) basis. Condensation in the air supply should be minimized

Natural Gas: Natural gas must be clean, dry, oil-free, and noncorrosive. H_2S content should not exceed 20 ppm.

Steady-State Air Consumption(2)(3)

Standard Relay:
At 1.4 bar (20 psig) supply pressure: Less than 0.38 normal m^3/hr (14 scfh)
At 5.5 bar (80 psig) supply pressure: Less than 1.3 normal m^3/hr (49 scfh)

Low Bleed Relay:
At 1.4 bar (20 psig) supply pressure: Average value 0.056 normal m^3/hr (2.1 scfh)
At 5.5 bar (80 psig) supply pressure: Average value 0.184 normal m^3/hr (6.9 scfh)

Maximum Output Capacity(2,3)

At 1.4 bar (20 psig) supply pressure: 10.0 normal m^3/hr (375 scfh)
At 5.5 bar (80 psig) supply pressure: 29.5 normal m^3/hr (1100 scfh)

Operating Ambient Temperature Limits(1)(4)

-40 to 85°C (-40 to 185°F)
-52 to 85°C (-62 to 185°F) for instruments utilizing the Extreme Temperature option (fluorosilicone elastomers)
-52 to 125°C (-62 to 257°F) for remote-mount feedback unit

Independent Linearity

Typical Value: ±0.50% of output span

Electromagnetic Compatibility

Meets EN 61326-1 (First Edition)
Immunity—Industrial locations per Table 2 of the EN 61326-1 standard. Performance is shown in table 1-3 below.
Emissions—Class A
ISM equipment rating: Group 1, Class A

Lightning and Surge Protection—The degree of immunity to lightning is specified as Surge immunity in table 1-3. For additional surge protection commercially available transient protection devices can be used.

Vibration Testing Method

Tested per ANSI/ISA-S75.13.01 Section 5.3.5. A resonant frequency search is performed on all three axes. The instrument is subjected to the ISA specified 1/2 hour endurance test at each major resonance.

-continued-

Table 1-2. Specifications (continued)

Input Impedance

The input impedance of the DVC6200 active electronic circuit is not purely resistive. For comparison to resistive load specifications, an equivalent impedance of 550 ohms may be used. This value corresponds to 11V @ 20 mA.

Humidity Testing Method

Tested per IEC 61514-2

Electrical Classification

These approvals are only applicable to the DVC6200 digital valve controller. DVC6205 base unit and DVC6215 remote feedback unit approvals will be included when available

Hazardous Area Approvals:

CSA— Intrinsically Safe, Explosion-proof, Division 2, Dust Ignition-proof

FM— Intrinsically Safe, Explosion-proof, Non-incendive, Dust Ignition-proof

ATEX— Intrinsically Safe and Dust, Flameproof and Dust, Type n and Dust

IECEx— Intrinsically Safe, Flameproof, Type n

Electrical Housing:

CSA— Type 4X, IP66
FM— NEMA 4X
ATEX— IP66
IECEx— IP66

Refer to Special Instructions for "Safe Use" and Installation in Hazardous Locations, starting on page 11, and Appendix B for specific approval information

The Gas Certified DVC6200 is CSA, FM, ATEX, and IECEx approved for use with natural gas as the supply medium

Connections

Supply Pressure: 1/4 NPT internal and integral pad for mounting 67CFR regulator
Output Pressure: 1/4 NPT internal
Tubing: 3/8-inch recommended
Vent: 3/8 NPT internal
Electrical: 1/2 NPT internal, M20 adapter optional

Actuator Compatibility

Stem Travel (Sliding-Stem Linear):

Minimum: 11 mm (0.45 inch)(5)
Maximum: 606 mm (23.875 inches)

Shaft Rotation (Quarter-Turn Rotary):

Minimum: 45°
Maximum: 90°

Weight

DVC6200: 3.5 kg (7.7 lbs)

DVC6205:. 4.1 kg (9 lbs)

DVC6215: 1.4 kg (3.1 lbs)

Construction Materials

Housing, module base and terminal box: ASTM B85 A03600 low copper aluminum alloy
Cover: Thermoplastic polyester
Elastomers: Nitrile (standard)

Options

■ Supply and output pressure gauges or ■ Tire valves, ■ Integral mounted filter regulator, ■ Low-Bleed Relay, ■ Extreme Temperature, ■ Natural Gas Certified

Contact your Emerson Process Management sales office, or go to www.FIELDVUE.com for additional information.

Declaration of SEP

Fisher Controls International LLC declares this product to be in compliance with Article 3 paragraph 3 of the Pressure Equipment Directive (PED) 97 / 23 / EC. It was designed and manufactured in accordance with Sound Engineering Practice (SEP) and cannot bear the CE marking related to PED compliance.

However, the product *may* bear the CE marking to indicate compliance with *other* applicable European Community Directives.

NOTE: Specialized instrument terms are defined in ANSI/ISA Standard 51.1 - Process Instrument Terminology.
1. The pressure/temperature limits in this document and any other applicable code or standard should not be exceeded.
2. Normal m^3/hour - Normal cubic meters per hour at 0°C and 1.01325 bar, absolute. Scfh - Standard cubic feet per hour at 60°F and 14.7 psia.
3. Values at 1.4 bar (20 psig) based on a single-acting direct relay; values at 5.5 bar (80 psig) based on double-acting relay.
4. Temperature limits vary based on hazardous area approval.
5. For travel less than 11 mm (0.45 inch) contact your Emerson Process Management sales office.

Table 1-3. EMC Summary Results—Immunity

Port	Phenomenon	Basic Standard	Test Level	Performance Criteria[1]	
				Point-to-Point	Multi-drop
Enclosure	Electrostatic discharge (ESD)	IEC 61000-4-2	4 kV contact 8 kV air	A[2]	A
	Radiated EM field	IEC 61000-4-3	80 to 1000 MHz @ 10V/m with 1 kHz AM at 80% 1400 to 2000 MHz @ 3V/m with 1 kHz AM at 80% 2000 to 2700 MHz @ 1V/m with 1 kHz AM at 80%	A	A
	Rated power frequency magnetic field	IEC 61000-4-8	30 A/m at 50/60Hz	A	A
I/O signal/control	Burst	IEC 61000-4-4	1 kV	A[2]	A
	Surge	IEC 61000-4-5	1 kV	B	B
	Conducted RF	IEC 61000-4-6	150 kHz to 80 MHz at 3 Vrms	A	A

Performance criteria: +/- 1% effect.
1. A = No degradation during testing. B = Temporary degradation during testing, but is self-recovering.
2. Excluding auxiliary switch function, which meets Performance Criteria B.

Section 2 Installation

⚠ WARNING

Avoid personal injury or property damage from sudden release of process pressure or bursting of parts. Before proceeding with any Installation procedures:

- **Always wear protective clothing, gloves, and eyewear to prevent personal injury or property damage.**
- **If installing into an existing application, also refer to the WARNINGS at the beginning of the Maintenance section of this instruction manual.**
- **Check with your process or safety engineer for any additional measures that must be taken to protect against process media.**

⚠ WARNING

To avoid static discharge from the plastic cover, do not rub or clean the cover with solvents. To do so could result in an explosion. Clean with a mild detergent and water only.

Special Instructions for "Safe Use" and Installations in Hazardous Locations

Certain nameplates may carry more than one approval, and each approval may have unique installation/wiring requirements and/or conditions of "safe use". These special instructions for "safe use" are in addition to, and may override, the standard installation procedures. Special instructions are listed by approval type.

⚠ WARNING

Failure to follow these conditions of "safe use" could result in personal injury or property damage from fire or explosion, or area re-classification.

Note

These special instructions for ""safe use" are only applicable to the DVC6200 digital valve controller. DVC6205 base unit and DVC6215 remote feedback unit approvals will be included when available.

CSA

Special Conditions of Safe Use

Intrinsically Safe, Explosion-proof, Division 2, Dust Ignition-proof

No special conditions for safe use.

Refer to table 2-1 for approval information, figure B-1 for the CSA loop schematic, and figure B-2 for the CSA nameplate.

Table 2-1. Hazardous Area Classifications—CSA (Canada)

Certification Body	Instrument	Certification Obtained	Entity Rating	Temperature Code	Enclosure Rating
CSA	DVC6200(1)	Intrinsically Safe Ex ia Intrinsically Safe Class I,II,III Division 1 GP A,B,C, D,E,F,G per drawing GE42818 T5 Natural Gas Approved	Vmax = 30 VDC Imax = 226 mA Ci = 5 nF Li = 0.55 mH	T5(Tamb ≤ 80°C)	Type 4X, IP66 Single Seal Device
		Explosion-proof Class I Division 1 GP B,C,D T6 Natural Gas Approved	---	T6(Tamb ≤ 80°C)	Type 4X, IP66 Single Seal Device
		Class I Division 2 GP A,B,C,D T6 Class II Division 1 GP E,F,G T6 Class II Division 2 GP F,G T6 Class III Natural Gas Approved	---	T6(Tamb ≤ 80°C)	Type 4X, IP66 Single Seal Device

1. These approvals are only applicable to the DVC6200 digital valve controller. DVC6205 base unit and DVC6215 remote feedback unit approvals will be included when available.

FM

Special Conditions of Safe Use

Intrinsically Safe, Explosion-proof, Non-Incendive, Dust Ignition-proof

1. When product is used with natural gas as the pneumatic medium, the maximum working pressure of the natural gas supply shall be limited to 145 psi.
2. When product is used with natural gas as the pneumatic medium the product shall not be permitted in a Class I, Division 2, Group A, B, C, D location without the proper venting installation per the manufacturer's instruction manual.

Refer to table 2-2 for approval information, figure B-3 for the FM loop schematic, and figure B-4 for the FM nameplate.

Table 2-2. Hazardous Area Classifications—FM (United States)

Certification Body	Instrument	Certification Obtained	Entity Rating	Temperature Code	Enclosure Rating
FM	DVC6200(1)	Intrinsically Safe Class I,II,III Division 1 GP A,B,C, D,E,F,G per drawing GE42819 T5 Natural Gas Approved	Vmax = 30 VDC Imax = 226 mA Ci = 5 nF Li = 0.55 mH Pi = 1.4 W	T5(Tamb ≤ 80°C)	NEMA 4X
		Explosion-proof Class I Division 1 GP B,C,D T6 Natural Gas Approved	---	T6(Tamb ≤ 80°C)	NEMA 4X
		Class I Division 2 GP A,B,C,D T6 Class II Division 1 GP E,F,G T6 Class II Division 2 GP F,G T6 Class III Natural Gas Approved	---	T6(Tamb ≤ 80°C)	NEMA 4X

1. These approvals are only applicable to the DVC6200 digital valve controller. DVC6205 base unit and DVC6215 remote feedback unit approvals will be included when available.

ATEX

Special Conditions for Safe Use

Intrinsically Safe, Dust

1. This apparatus can only be connected to an intrinsically safe certified equipment and this combination must be compatible as regards the intrinsically safe rules.

2. The electrical parameters of this equipment must not exceed any following values:
   $U_O \leq$ 30 V; $I_O \leq$ 226 mA; $P_O \leq$ 1.4 W
3. Operating ambient temperature: -52°C or -40°C to + 80°C
4. For the model with aluminum body: the apparatus must not be submitted to frictions or mechanical impacts.
5. Covered by standards EN 60079-0 (2006), EN 60079-11 (2007), EN 60079-26 (2007), EN 61241-0 (2006) and EN 61241-11 (2006).

Refer to table 2-3 for additional approval information, and figure B-5 for the the ATEX Intrinsically Safe, Dust nameplate.

Flameproof, Dust

Operating ambient temperature: -52°C or -40°C to + 85°C

Refer to table 2-3 for additional approval information, and figure B-6 for the ATEX Flameproof, Dust nameplate.

Type n, Dust

Operating ambient temperature: -52°C or -40°C to + 80°C

Refer to table 2-3 for additional approval information, and figure B-7 for the ATEX Type n, Dust nameplate.

Table 2-3. Hazardous Area Classifications—ATEX

Certificate	Instrument	Certification Obtained	Entity Rating	Temperature Code	Enclosure Rating
ATEX	DVC6200(1)	⟨Ex⟩ II 1 G & D Intrinsically Safe Ga Ex ia IIC T5/T6 Dust Da Ex iaD 20 T100°C(Tamb ≤ 80°C) Da Ex iaD 20 T85°C(Tamb ≤ 75°C) Natural Gas Approved	Ui = 30 V Ii = 226 mA Ci = 5 nF Li = 0.55 mH Pi = 1.4 W	T5(Tamb ≤ 80°C) T6(Tamb ≤ 75°C)	IP66
		⟨Ex⟩ II 2 G & D Flameproof Ex d IIC T5/T6 Dust Ex tD A21 IP66 T90°C(Tamb ≤ 85°C) Ex tD A21 IP66 T80°C(Tamb ≤ 75°C) Natural Gas Approved	---	T5(Tamb ≤ 85°C) T6(Tamb ≤ 75°C)	IP66
		⟨Ex⟩ II 3 G & D Type n Ex nCnL T5/T6 Dust Ex tD A22 IP66 T85°C(Tamb ≤ 80°C) Ex tD A22 IP66 T80°C(Tamb ≤ 75°C) Natural Gas Approved	---	T5(Tamb ≤ 80°C) T6(Tamb ≤ 75°C)	IP66

1. These approvals are only applicable to the DVC6200 digital valve controller. DVC6205 base unit and DVC6215 remote feedback unit approvals will be included when available.

IECEx

Conditions of Certification

Intrinsically Safe, Flameproof, Type n

Ex ia

1. **Warning:** Electrostatic charge hazard. Do not rub or clean with solvents. To do so could result in an explosion.

-52°C/-40°C ≤ Ta ≤ +80°C; T6 (Ta ≤ 75°C); T5 (Ta ≤ 80°C)

Electrical parameters for protection type “i”: Ui ≤ 30V, Ii ≤ 226 mA, Pi ≤ 1.4W, Ci ≤ 5 nF, Li ≤ 0.55 mH

EX d / Ex nC

1. Do not open while energized.
2. **Warning:** Electrostatic charge hazard. Do not rub or clean with solvents. To do so could result in an explosion

-52°C/-40°C ≤ Ta ≤ +80°C; T6 (Ta ≤ 75°C); T5 (Ta ≤ 80°C)

Refer to table 2-4 for additional approval information, figure B-8 for the IECEx loop schematic, and figure B-9 for the IECEx nameplate.

Table 2-4. Hazardous Area Classifications—IECEx

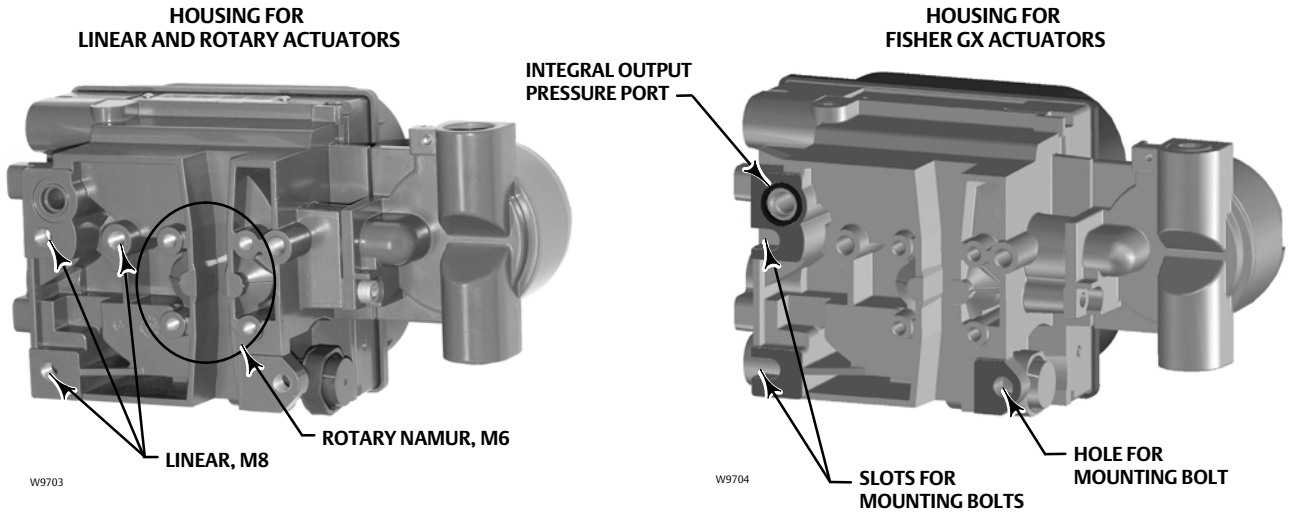
Certificate	Instrument	Certification Obtained	Entity Rating	Temperature Code	Enclosure Rating
IECEx	DVC6200(1)	Intrinsically Safe Gas Ex ia IIC T5/T6 per drawing GE42990 Natural Gas Approved	Ui = 30 VDC Ii = 226 mA Ci = 5 nF Li = 0.55 mH Pi = 1.4 W	T5(Tamb ≤ 80°C) T6(Tamb ≤ 75°C)	IP66
		Flameproof Gas Ex d IIC T5/T6 Natural Gas Approved	- - -	T5(Tamb ≤ 80°C) T6(Tamb ≤ 75°C)	IP66
		Type n Gas Ex nC IIC T5/T6 Natural Gas Approved	- - -	T5(Tamb ≤ 80°C) T6(Tamb ≤ 75°C)	IP66

1. These approvals are only applicable to the DVC6200 digital valve controller. DVC6205 base unit and DVC6215 remote feedback unit approvals will be included when available.

Mounting the DVC6200 Digital Valve Controller

The DVC6200 housing is available in two different configurations, depending on the actuator mounting method. Figure 2-1 shows the available configurations.

Figure 2-1. Housing Configurations



The feedback system for the DVC6200 digital valve controller utilizes a magnetic assembly for linkage-less, non-contacting position measurement. In order to prevent inadvertent stem movement while the instrument is in operation, magnetic tools (such as a magnetic-tipped screwdriver) should not be used.

Note

The magnet assembly may be referred to as a magnetic array in user interface tools.

CAUTION

The magnet assembly material has been specifically chosen to provide a long-term stable magnetic field.

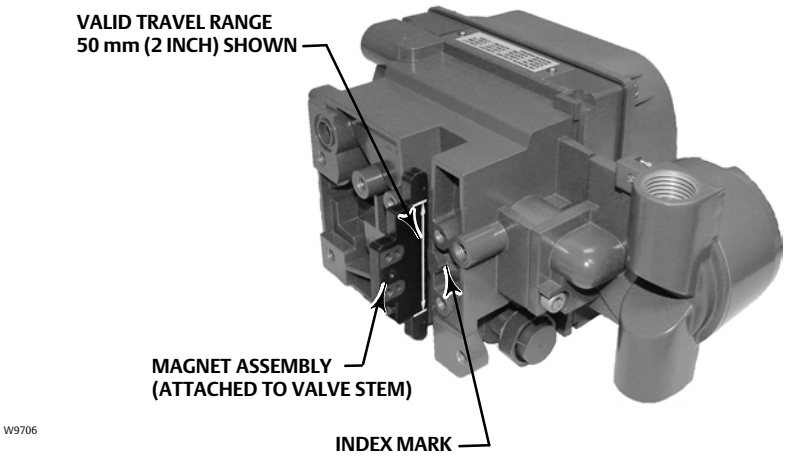
However, as with any magnet, care must be taken when handling the magnet assembly. Another high powered magnet placed in close proximity (less than 25 mm) can cause permanent damage. Potential sources of damaging equipment include, but are not limited to: transformers, DC motors, stacking magnet assemblies.

Note

As a general rule, do not use less than 60% of the magnet assembly travel range for full travel measurement. Performance will decrease as the assembly is increasingly subranged.

The linear magnet assemblies have a valid travel range indicated by arrows molded into the piece. This means that the hall sensor (on the back of the DVC6200 housing) has to remain within this range throughout the entire valve travel. See figure 2-2. The linear magnet assemblies are symmetrical. Either end may be up.

Figure 2-2. Travel Range



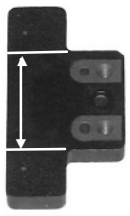
Note

Mounting the instrument vertically, with the vent at the bottom of the assembly, or horizontally, with the vent pointing down, is recommended to allow drainage of moisture that may be introduced via the instrument air supply.

There are a variety of mounting brackets and kits that are used to mount the DVC6200 to different actuators. Depending on the actuator, there will be differences in fasteners, brackets, and connecting linkages.

Each mounting kit will include one of the magnet assemblies illustrated in figure 2-3.

Figure 2-3. Magnet Assemblies



AVAILABLE CONSTRUCTIONS:
SSTEM #19 ASSEMBLY (19 mm / 3/4 INCH)
SSTEM #25 ASSEMBLY (25 mm / 1 INCH)

AVAILABLE CONSTRUCTIONS:
SSTEM #38 ASSEMBLY (38 mm / 1-1/2 INCH)
SSTEM #50 ASSEMBLY (50 mm / 2 INCH)
SSTEM #100 ASSEMBLY (100 mm / 4 INCH)

AVAILABLE CONSTRUCTIONS:
SSTEM #1 ROLLER ASSEMBLY
RSHAFT #1 WINDOW ASSEMBLY
(FISHER 2052 SIZE 2 & 3, 1051/1052 SIZE 40-70, 1061 SIZE 30-100, SLIDING-STEM > 100 mm (4 INCHES)
RSHAFT #2 WINDOW ASSEMBLY
(2052 SIZE 1, 1051/1052 SIZE 20-33)

RSHAFT END ASSEMBLY 90 DEG

If ordered as part of a control valve assembly, the factory will mount the digital valve controller on the actuator and calibrate the instrument. If purchased separately, you will need a mounting kit to mount the digital valve controller on the actuator. Each mounting kit includes detailed information on mounting the digital valve controller to a specific actuator. Refer to table 2-5 for the more common Fisher actuator mounting instructions, available at www.fisher.com or your Emerson Process Management sales office.

For general mounting guidelines, refer to the DVC6200 quick start guide (D103410X012), available at www.fisher.com or your Emerson Process Management sales office.

Table 2-5. DVC6200 Mounting Instructions

Instructions for Mounting:	Part Number
585C/585CR Size 25 Actuator with or without Handjack	D103439X012
585C/585CR Size 50 Actuator with or without Handjack	D103440X012
657 and 667 Size 30-60 Actuators	D103441X012
657 and 667 Size 34-60 Actuators with Handwheel	D103442X012
657 and 667 Size 70, 76, and 87 Actuators (up to 2 inch travel)	D103443X012
657 and 667 Size 70, 76, and 87 Actuators (4 inch travel)	D103444X012
657 and 667 Size 80 Actuators (up to 2 inch travel)	D103445X012
657 and 667 Size 80 Actuators (4 inch travel)	D103446X012
1051 Size 33 and 1052 Size 20 and 33 Actuators (Window Mount)	D103447X012
1051 and 1052 Size 33 Actuators (End Mount)	D103448X012
1051 and 1052 Size 40-70 Actuators (Window Mount)	D103449X012
1051 and 1052 Size 40-70 Actuators (End Mount)	D103450X012
1052 Size 20 Actuator (End Mount)	D103451X012
1061 Size 30-68 Actuator (Window Mount)	D103453X012
1061 Size 80-100 Actuator (Window Mount)	D103452X012
2052 Size 1, 2, 3 Actuator (End Mount)	D103454X012
2052 Size 1, 2, 3 Actuator with Spacer (Window Mount)	D103455X012
Baumann Sliding-Stem Actuators	D103456X012
GX Control Valve and Actuator System	D103457X012
IEC60534-6-1 (NAMUR) Sliding Stem Actuators	D103458X012
IEC60534-6-2 (NAMUR) Rotary Actuators	D103459X012

Mounting the DVC6205 Base Unit

For remote-mounted digital valve controllers, the DVC6205 base unit ships separately from the control valve and does not include tubing, fittings or wiring. See the instructions that come with the mounting kit for detailed information on mounting the feedback unit to a specific actuator model.

Mount the DVC6205 base unit on a 50.8 mm (2 inch) pipestand or wall. The included bracket is used for either mounting method.

Wall Mounting

Refer to figures 2-4 and 2-5. Drill two holes in the wall using the dimensions shown in figure 2-4. Attach the mounting bracket to the base unit using four spacers and 25.4 mm (1-inch) 1/4-20 hex head screws. Attach the base unit to the wall using suitable screws or bolts.

Pipestand Mounting

Refer to figure 2-5. Position a standoff on the back of the base unit. Using two 101.6 mm (4-inch) 1/4-20 hex head screws loosely attach the base unit to the pipestand with the mounting bracket. Position the second standoff, then using the remaining 101.6 mm (4-inch) hex head screws, securely fasten the base unit to the pipe stand.

Figure 2-4. FIELDVUE DVC6205 Base Unit with Mounting Bracket (Rear View)

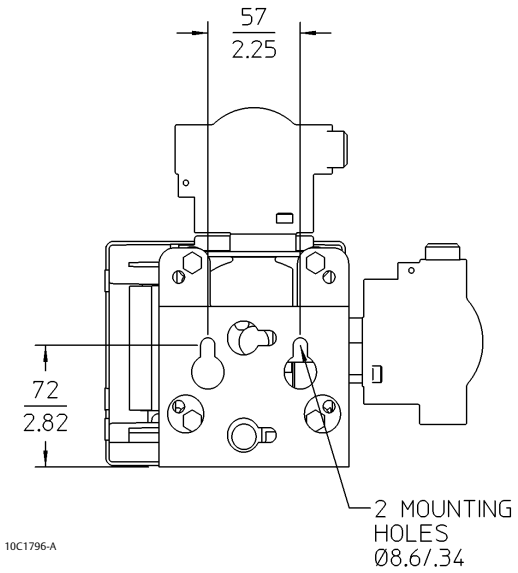
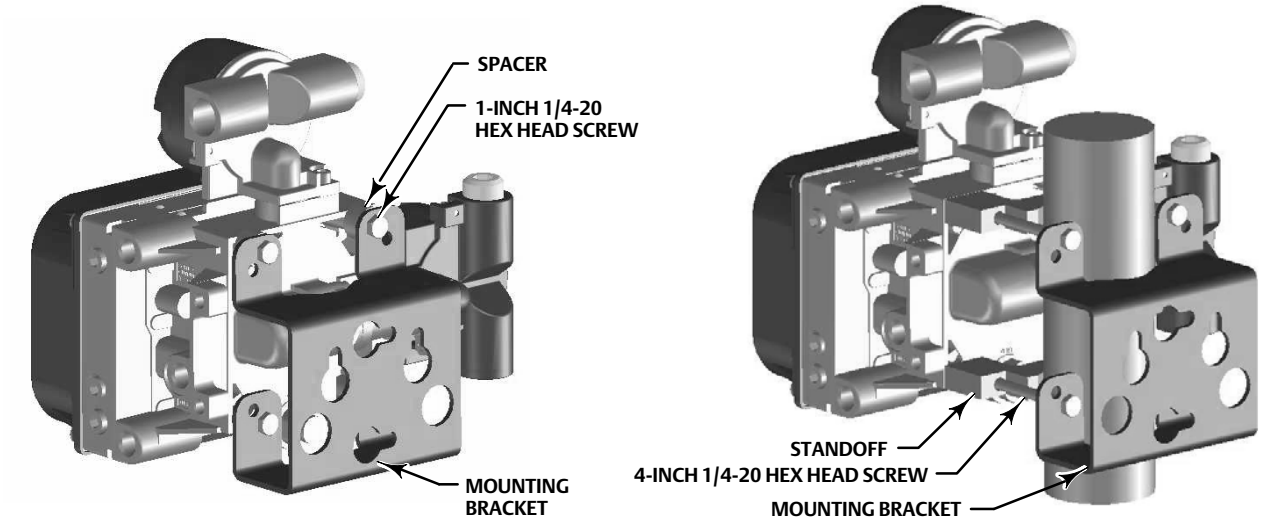


Figure 2-5. FIELDVUE DVC6205 Base Unit Mounting



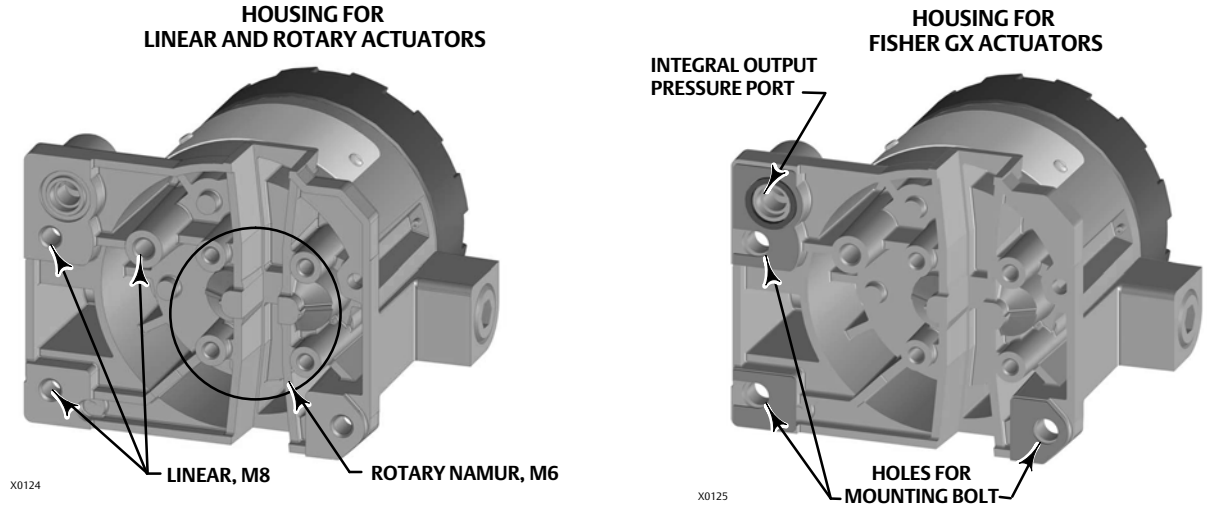
Mounting the DVC6215 Feedback Unit

If ordered as part of a control valve assembly, the factory mounts the feedback unit on the actuator, makes pneumatic connections to the actuator, sets up, and calibrates the instrument. If you purchased the feedback unit separately, you will need a mounting kit to mount the feedback unit on the actuator. See the instructions that come with the mounting kit for detailed information on mounting the feedback unit to a specific actuator model.

The DVC6215 housing is available in two different configurations, depending on the actuator mounting method. Figure 2-6 shows the available configurations. The feedback system for the DVC6215 feedback unit utilizes a magnetic

assembly for true linkage-less, non-contacting position measurement. In order to prevent inadvertent stem movement while the instrument is in operation, magnetic tools (such as a magnetic-tipped screwdriver) should not be used.

Figure 2-6. Feedback Unit Housing Configurations



CAUTION

The magnet assembly material has been specifically chosen to provide a long-term stable magnetic field.

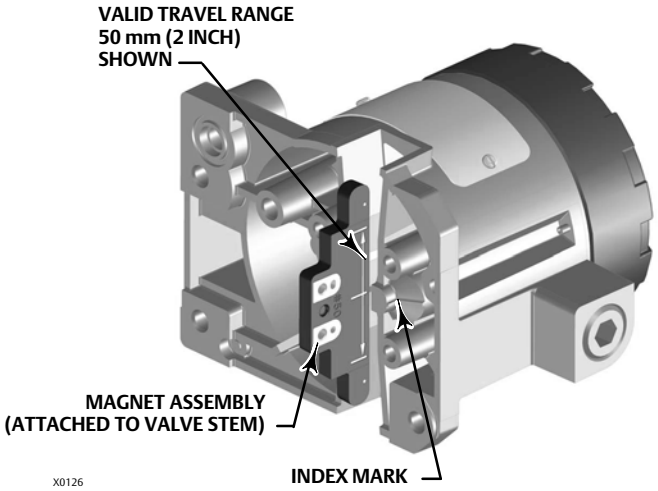
However, as with any magnet, care must be taken when handling the magnet assembly. Another high powered magnet placed in close proximity (less than 25 mm) can cause permanent damage. Potential sources of damaging equipment include, but are not limited to: transformers, DC motors, stacking magnet assemblies.

Note

As a general rule, do not use less than 60% of the magnet assembly travel range for full travel measurement. Performance will decrease as the assembly is increasingly subranged.

The linear magnet assemblies have a valid travel range indicated by arrows molded into the piece. This means that the hall sensor (on the back of the DVC6215 housing) has to remain within this range throughout the entire valve travel. See figure 2-7. The linear magnet assemblies are symmetrical. Either end may be up.

Figure 2-7. Travel Range



There are a variety of mounting brackets and kits that are used to mount the DVC6215 to different actuators.

Note

The DVC6215 feedback unit uses the same mountings as the DVC6200 digital valve controller.

However, despite subtle differences in fasteners, brackets, and connecting linkages, the procedures for mounting can be categorized as follows:

- Sliding-stem linear actuators
- Fisher rotary actuators
- GX actuator
- Quarter-turn actuators

See figure 2-3 for examples of the different travel feedback magnet assemblies.

Sliding-Stem Linear Actuators up to 100 mm (4 Inches) of Travel

The DVC6215 feedback unit has linkage-less, non-contact feedback on sliding-stem actuators with up to 102 mm (4 inches) travel. Figure 2-8 shows a typical mounting on a sliding stem actuator. For actuators with greater than 100 mm (4 inches) travel, see the guidelines on page 22.

1. Isolate the control valve from the process line pressure and release pressure from both sides of the valve body. Shut off all pressure lines to the actuator, releasing all pressure from the actuator. Use lock-out procedures to be sure that the above measures stay in effect while you work on the equipment.
2. Attach the mounting bracket to the actuator.

Figure 2-8. Mounting Parts for Sliding-Stem Actuator with up to 100 mm (4 inches) Travel

3. Loosely attach the feedback pieces and magnet assembly to the valve stem connector. Do not tighten the fasteners because fine adjustment is required.

CAUTION

Do not install a magnet assembly that is shorter than the physical travel of the actuator. Loss of control will result from the magnet assembly moving outside the range of the index mark in the feedback slot of the DVC6215 housing.

4. Using the alignment template (supplied with the mounting kit), position the magnet assembly inside the retaining slot.
5. Align the magnet assembly as follows:

For air-to-open actuators (e.g. Fisher 667) vertically align the magnet assembly so that the center line of the alignment template is lined up as close as possible with the upper extreme of the valid travel range on the magnet assembly. The magnet assembly should be positioned so that the index mark in the feedback slot of the DVC6215 housing is between the valid range on the magnet assembly throughout the range of travel. See figure 2-9.

For air-to-close actuators (e.g. Fisher 657) vertically align the magnet assembly so that the center line of the alignment template is lined up as close as possible with the lower extreme of the valid travel range on the magnet assembly. The magnet assembly should be positioned so that the index mark in the feedback slot of the DVC6215 housing is between the valid range on the magnet assembly throughout the range of travel. See figure 2-10.

Figure 2-9. Air-to-Open Magnet Assembly Alignment

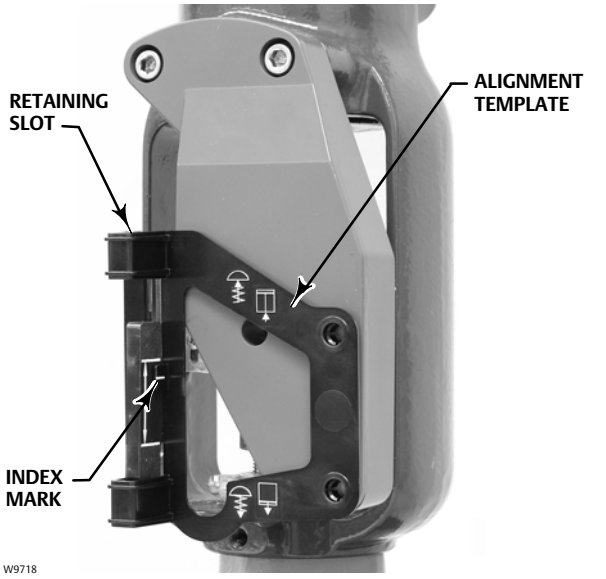
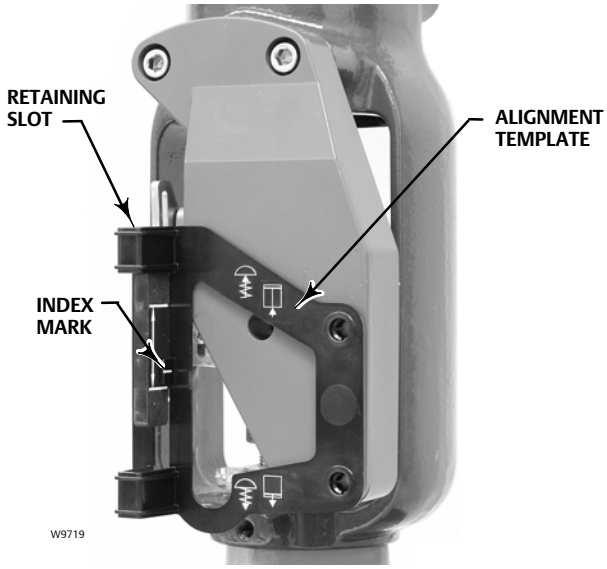


Figure 2-10. Air-to-Close Magnet Assembly Alignment



6. Tighten the fasteners and remove the alignment template.
7. Mount the feedback unit to the mounting bracket, using the mounting bolts.
8. Check for clearance between the magnet assembly and the DVC6215 feedback slot.

Note

Ensure that there is clearance between the magnet assembly and the DVC6215 housing slot throughout the full range of travel.

Fisher Rotary Actuators and Sliding-Stem Linear Actuators over 100 mm (4 Inches) Travel

The DVC6215 feedback unit uses a cam (designed for linear response) and roller as the feedback mechanism. See figures 2-11 and 2-12.

Figure 2-11. Mounting on Rotary Actuators

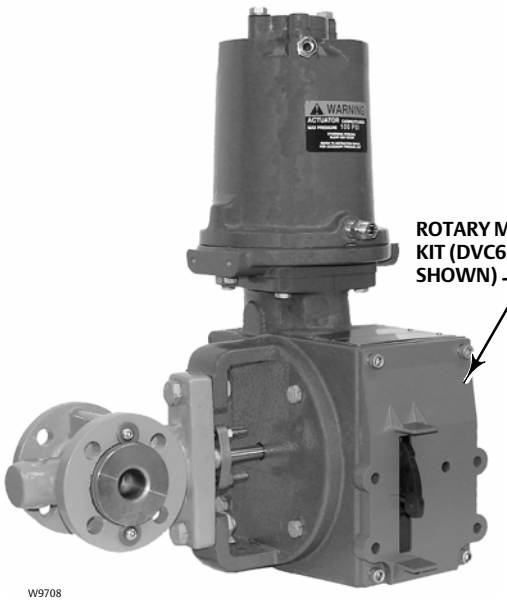
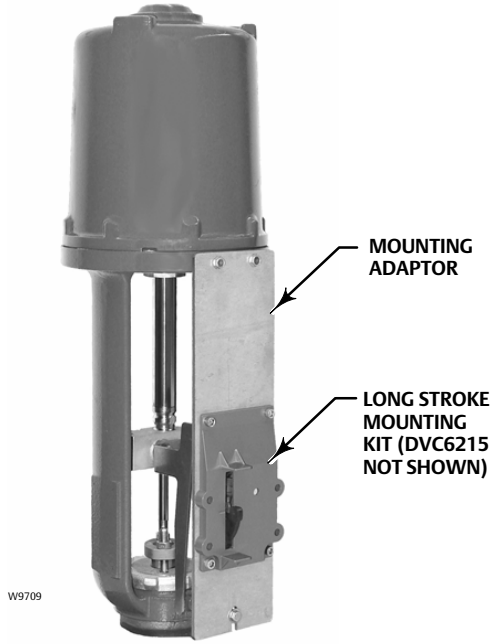


Figure 2-12. Mounting on Sliding-Stem (Linear) Actuators over 100 mm (4 Inches) Travel



Note

All cams supplied with FIELDVUE mounting kits are characterized to provide a linear response.

There are three different mounting adaptions, based on the actuator design (see figure 2-13).

Fisher Rotary Actuators

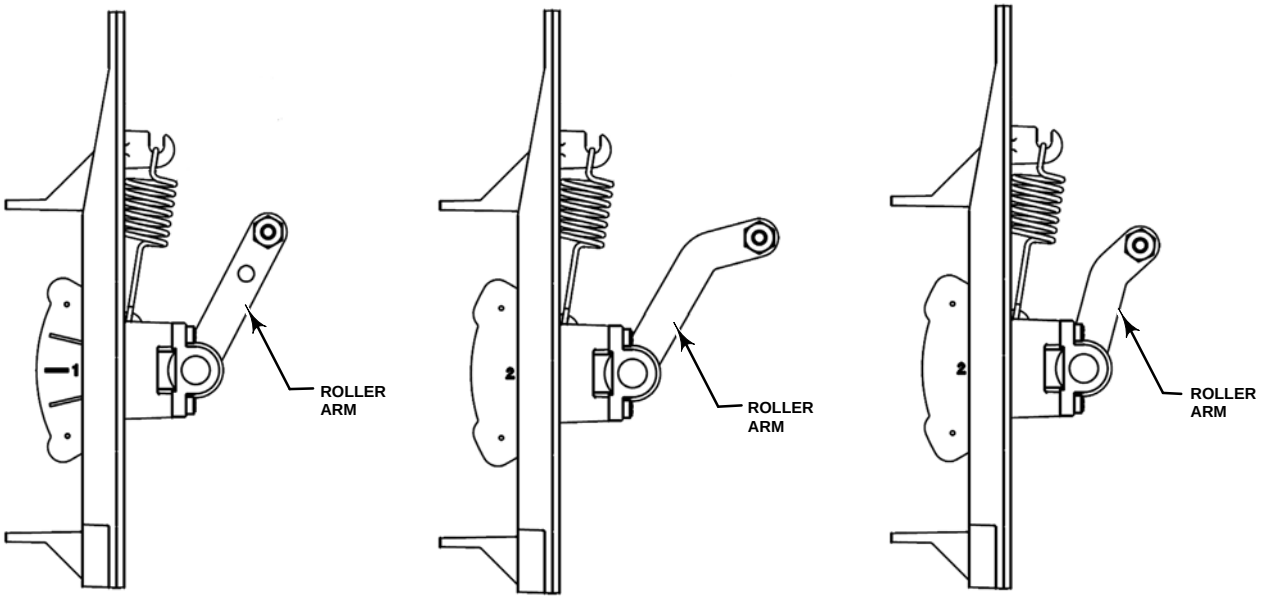
Refer to the following guidelines when mounting on rotary actuators.

1. Isolate the control valve from the process line pressure and release pressure from both sides of the valve body. Shut off all pressure lines to the pneumatic actuator, releasing all pressure from the actuator. Use lock-out procedures to be sure that the above measures stay in effect while working on the equipment.
2. Verify that the appropriate cam is installed on the actuator as described in the instructions included with the mounting kit.
3. Mount the DVC6215 on the actuator as follows:

- If required, a mounting adaptor is included in the mounting kit. Attach the adaptor to the feedback unit, then attach the feedback unit assembly to the actuator. The roller on the feedback arm will contact the actuator cam as it is being attached.

- If no mounting adaptor is required, attach the feedback unit and mounting kit assembly to the actuator. The roller on the feedback arm will contact the actuator cam as it is being attached.

Figure 2-13. Mounting Variations



VARIATION A **VARIATION B** **VARIATION C**

VARIATION	ACTUATOR
A	2052 Size 2 and 3
	1051/1052 size 40-70
	1061 Size 30-100
	Sliding-Stem > 100 mm (4 inches)
B	2052 Size 1
C	1052 Size 20-33
	1051 Size 33

NOTE THE DIFFERENCE IN THE SHAPE AND LENGTH OF THE ROLLER ARM
E1229

Sliding-Stem Linear Actuators over 100 mm (4 Inches) Travel

Refer to the following guidelines when mounting on sliding-stem linear actuators over 100 mm (4 inches) travel (see figure 2-12).

1. Isolate the control valve from the process line pressure and release pressure from both sides of the valve body. Shut off all pressure lines to the pneumatic actuator, releasing all pressure from the actuator. Use lock-out procedures to be sure that the above measures stay in effect while working on the equipment.
2. Install the cam to the valve stem connector as described in the instructions included with the mounting kit.
3. Install the mounting adaptor to the actuator.
4. Attach the feedback unit and mounting kit assembly to the mounting adaptor. The roller on the feedback arm will contact the actuator cam as it is being attached.

GX Actuators

The DVC6215 feedback unit mounts directly on the GX actuator without the need for a mounting bracket.

Identify the yoke side to mount the DVC6215 feedback unit based on the actuator fail mode. Refer to the GX Control Valve and Actuator System instruction manual (D103175X012).

1. Isolate the control valve from the process line pressure and release pressure from both sides of the valve body. Shut off all pressure lines to the actuator, releasing all pressure from the actuator. Use lock-out procedures to be sure that the above measures stay in effect while you work on the equipment.
2. Loosely attach the feedback pieces and magnet assembly to the valve stem connector. Do not tighten the fasteners because fine adjustment is required.

CAUTION

Do not install a magnet assembly that is shorter than the physical travel of the actuator. Loss of control will result from the magnet assembly moving outside the range of the index mark in the feedback slot of the DVC6215 housing.

3. Using the alignment template (supplied with the mounting kit), position the feedback assembly inside the retaining slot.
4. Align the magnet assembly as follows:

For air-to-open GX actuators vertically align the magnet assembly so that the center line of the alignment template is lined up as close as possible with the upper extreme of the valid travel range on the magnet assembly. The magnet assembly should be positioned so that the index mark in the feedback slot of the DVC6215 housing is between the valid range on the magnet assembly throughout the range of travel. See figure 2-14.

For air-to-close GX actuators vertically align the magnet assembly so that the center line of the alignment template is lined up as close as possible with the lower extreme of the valid travel range on the magnet assembly. The magnet assembly should be positioned so that the index mark in the feedback slot of the DVC6215 housing is between the valid range on the magnet assembly throughout the range of travel. See figure 2-15.

Figure 2-14. Air-to-Open Fisher GX Magnet Assembly Alignment

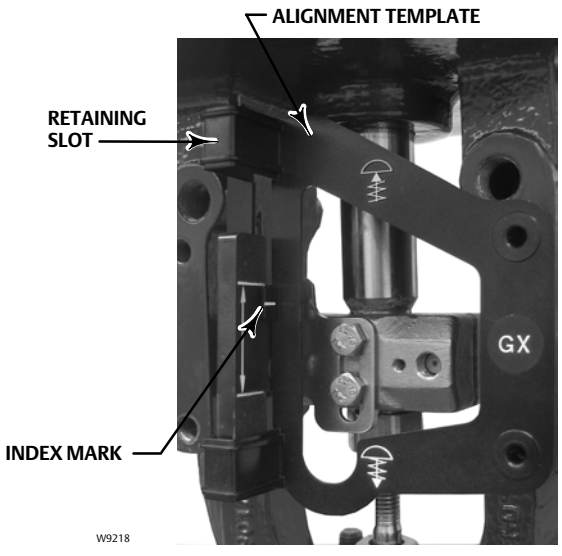
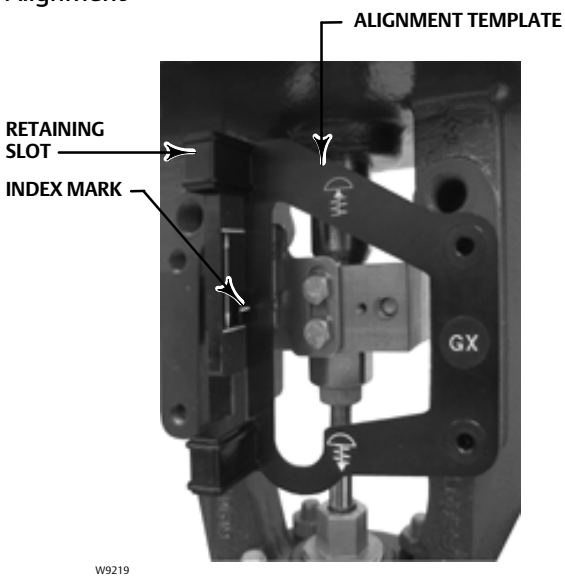


Figure 2-15. Air-to-Close Fisher GX Magnet Assembly Alignment

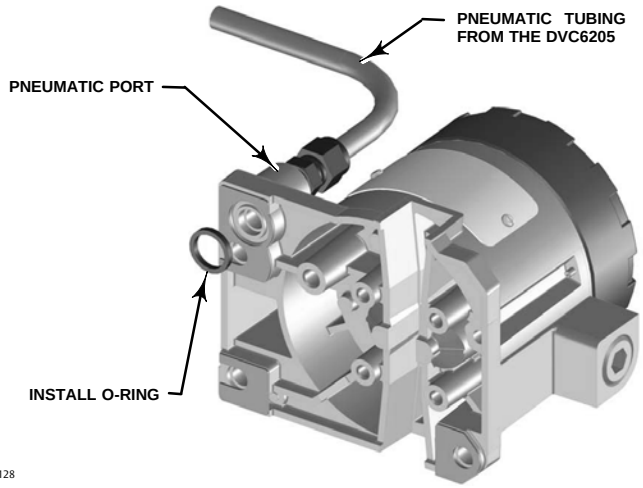


5. Tighten the fasteners and remove the alignment template. Continue on with the appropriate step 6 below.

Air-to-Open GX Actuators

6. The pneumatic output port on the DVC6215 lines up with the integral GX actuator pneumatic port. See figure 2-16.
7. Using a 5 mm hex wrench, attach the feedback unit to the GX actuator mounting pad on the side that has the open pneumatic port. Be sure to place the O-ring between the feedback units pneumatic output and the actuator mounting pad. Pneumatic tubing between the feedback unit and the actuator is not required because the air passages are internal to the actuator.
8. Connect the pneumatic tubing from the DVC6205 to the feedback units pneumatic port provided on the front of the DVC6215 as shown in figure 2-16.

Figure 2-16. Modifications for Fisher GX Actuator; Air-to-Open Construction Only



9. Check for clearance between the magnet assembly and the DVC6215 feedback slot.
10. If not already installed, install a vent in the port on the upper diaphragm casing's air supply connection on the actuator yoke leg.

Air-to-Close GX Actuators

6. Using a 5 mm hex wrench, attach the feedback unit to the GX actuator mounting pad.
7. Check for clearance between the magnet assembly and the DVC6215 feedback slot.
8. Install tubing between the actuator casing and the appropriate DVC6215 pneumatic output port.
9. If not already installed, install a vent in the port on the lower diaphragm casing.

Note

- To convert to air-to-open, install an O-ring between the feedback units pneumatic output and the actuator mounting pad. Connect pneumatic tubing from the DVC6205 to the DVC6215. Refer to figure 2-16.
- To convert to air-to-close, remove the O-ring between the feedback units pneumatic output and the actuator mounting pad. Disconnect the pneumatic tubing from the DVC6205 to the DVC6215. Install tubing between the pneumatic output connection of the DVC6205 to the pneumatic port on top of the actuator casing.

Quarter-Turn Rotary Actuators

The DVC6215 feedback unit can be mounted to any quarter-turn rotary actuator, as well as those that comply with the NAMUR guidelines. A mounting bracket and associated hardware are required. Refer to figure 2-17.

1. Isolate the control valve from the process line pressure and release pressure from both sides of the valve body. Shut off all pressure lines to the actuator, releasing all pressure from the actuator. Use lock-out procedures to be sure that the above measures stay in effect while you work on the equipment.
2. Attach the magnet assembly to the actuator shaft. At mid-travel, the flats on the magnet assembly must be parallel to the channel on the back of the DVC6215 housing, as shown in figure 2-18.
3. Install the mounting bracket on the actuator.
4. Attach the feedback unit to the mounting bracket using the 4 mounting bolts, as shown in figure 2-17.
5. Check for clearance between the magnet assembly and the DVC6215 feedback slot.
6. Install tubing between the actuator casing and the appropriate DVC6215 pneumatic output port.

Figure 2-17. Mounting on Quarter-Turn Actuators

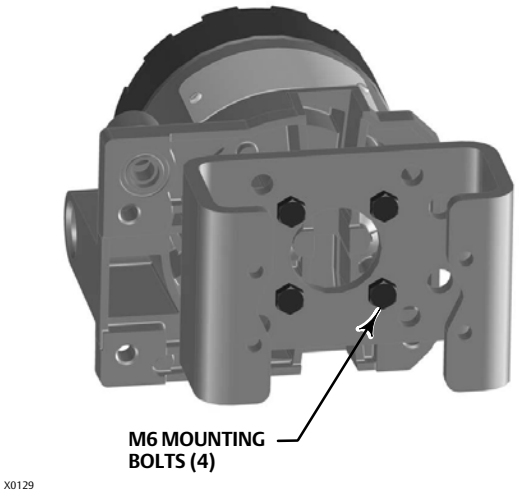
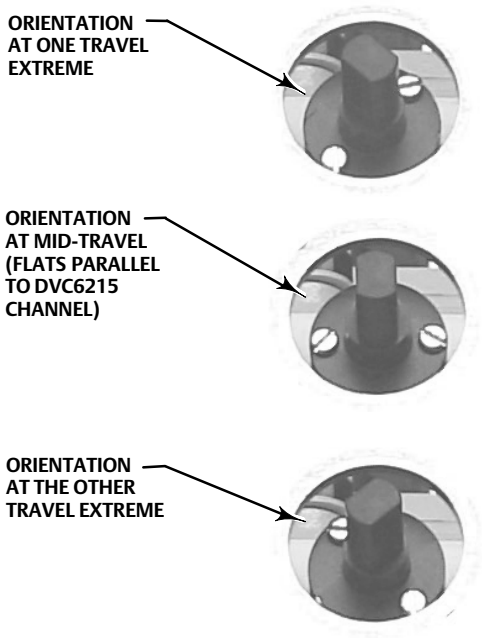


Figure 2-18. Magnet Assembly Orientation on Quarter-Turn Actuators


ORIENTATION AT ONE TRAVEL EXTREME
ORIENTATION AT MID-TRAVEL (FLATS PARALLEL TO DVC6215 CHANNEL)
ORIENTATION AT THE OTHER TRAVEL EXTREME

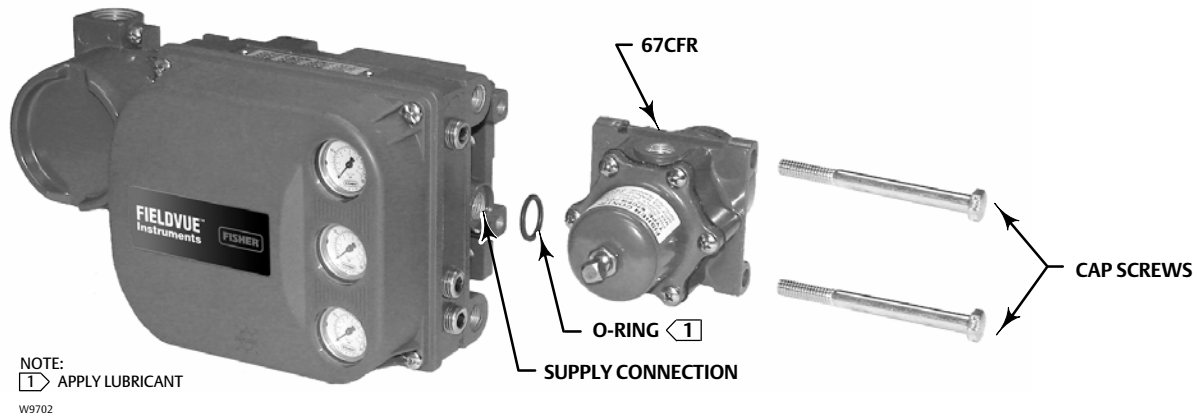
Mounting Fisher 67CFR Filter Regulator

A 67CFR filter regulator, when used with a DVC6200 digital valve controller, can be mounted one of three ways.

Integral-Mounted Regulator

Refer to figure 2-19. Lubricate an O-ring and insert it in the recess around the SUPPLY connection on the digital valve controller. Attach the 67CFR filter regulator to the side of the digital valve controller. Thread a 1/4-inch socket-head pipe plug into the unused outlet on the filter regulator. This is the standard method of mounting the filter regulator.

Figure 2-19. Mounting the Fisher 67CFR Regulator on a FIELDVUE DVC6200 Digital Valve Controller



Yoke-Mounted Regulator

Mount the filter regulator with two cap screws to the pre-drilled and tapped holes in the actuator yoke. Thread a 1/4-inch socket-head pipe plug into the unused outlet on the filter regulator. No O-ring is required.

Casing-Mounted Regulator

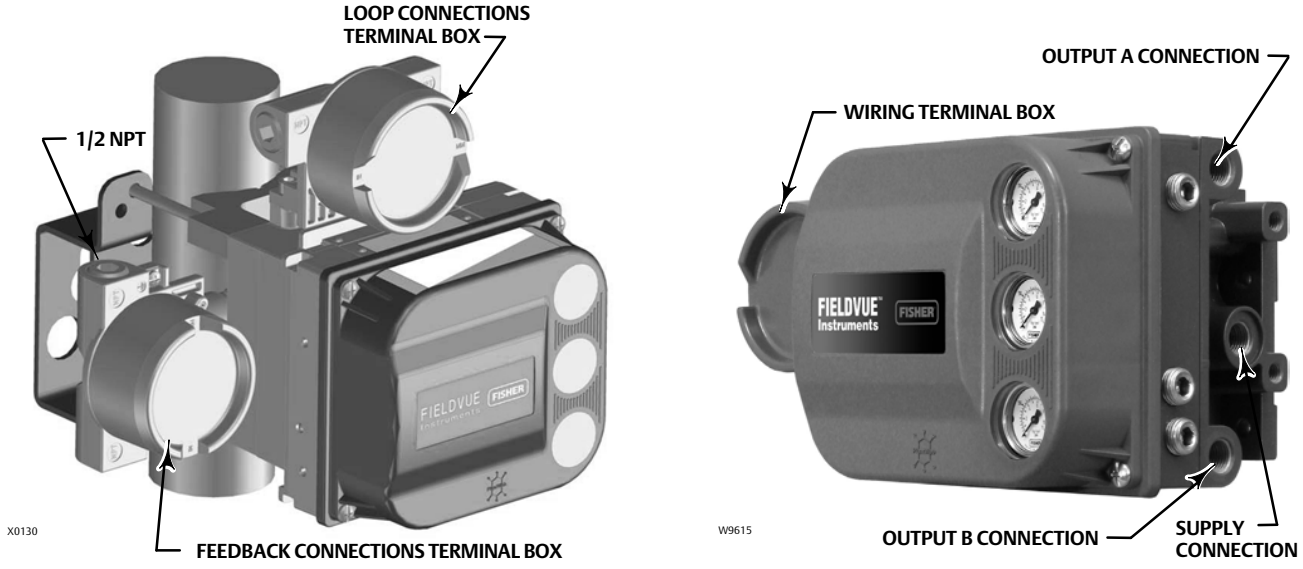
Use the separate 67CFR filter regulator casing mounting bracket provided with the filter regulator. Attach the mounting bracket to the 67CFR and then attach this assembly to the actuator casing. Thread a 1/4-inch socket-head pipe plug into the unused outlet on the filter regulator. No O-ring is required.

Pneumatic Connections

Pressure

Pressure connections are shown in figure 2-20. All pressure connections on the digital valve controller are 1/4 NPT internal connections. Use at least 10 mm (3/8-inch) tubing for all pressure connections. If remote venting is required a minimum of 12.7 mm (1/2-inch) tubing should be used. Refer to the vent subsection for remote venting information.

Figure 2-20. Pressure Connections



Note

Make pressure connections to the digital valve controller using tubing with at least 10 mm (3/8-inch) diameter.

Supply

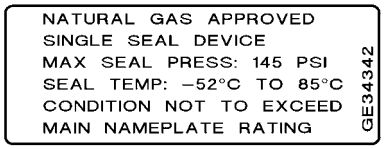
The DVC6200 can be used with air as the supply medium. In addition, Gas Certified DVC6200 constructions can be used with natural gas as the supply medium. If using natural gas as the pneumatic supply medium, natural gas will be used in the pneumatic output connections of the DVC6200 to any connected equipment. In normal operation the unit will vent the supply medium into the surrounding atmosphere unless it is remotely vented.

⚠ WARNING

Not all DVC6200 digital valve controllers are suitable for use with natural gas as the supply medium. If using natural gas as the supply medium, the DVC6200 must be Gas Certified. Using natural gas as the supply medium in a non-gas certified instrument can result in personal injury or property damage.

Gas Certified instruments can be identified by the natural gas approval label shown in figure 2-21. Contact your Emerson Process Management sales office for information on obtaining a Gas Certified DVC6200 digital valve controller.

Figure 2-21. Gas Certified Label



⚠ WARNING

- **To avoid personal injury or property damage resulting from bursting of parts, do not exceed maximum supply pressure.**
- **Personal injury or property damage may result from fire or explosion if natural gas is used as the supply medium and appropriate preventive measures are not taken. Preventive measures may include, but are not limited to, one or more of the following: Remote venting of the unit, re-evaluating the hazardous area classification, ensuring adequate ventilation, and the removal of any ignition sources. For information on remote venting of this controller, refer to page 31.**
- **Severe personal injury or property damage may occur from an uncontrolled process if the instrument supply medium is not clean, dry, oil-free, and noncorrosive. While use and regular maintenance of a filter that removes particles larger than 40 micrometers in diameter will suffice in most applications, check with an Emerson Process Management field office and industry instrument air quality standards for use with corrosive air or if you are unsure about the amount of air filtration or filter maintenance.**

Supply pressure must be clean, dry air that meets the requirements of ISA Standard 7.0.01. A maximum 40 micrometer particle size in the air system is acceptable. Further filtration down to 5 micrometer particle size is recommended. Lubricant content is not to exceed 1 ppm weight (w/w) or volume (v/v) basis. Condensation in the air supply should be minimized.

Alternatively, natural gas may be used as the supply pressure medium in Gas Certified DVC6200 digital valve controllers. Gas must be clean, dry, oil-free, and noncorrosive. H_2S content should not exceed 20 ppm.

If you are using a 67CFR filter regulator with standard 5 micrometer filter, connect the supply line to the 1/4 NPT IN connection and attach tubing from the output connection on the filter regulator to the SUPPLY connection on the instrument. If you are using an integral mounted 67CFR filter regulator, connect the supply to the IN connection on the regulator.

Output Connection

A factory mounted digital valve controller has its output piped to the supply connection on the actuator. If mounting the digital valve controller in the field, connect the 1/4 NPT digital valve controller output connection to the pneumatic actuator input connection.

Single-Acting Actuators

When using a single-acting direct digital valve controller (relay A or C) on a single-acting actuator, connect OUTPUT A to the actuator pneumatic input. When using a single-acting reverse digital valve controller (relay B) on a single-acting actuator, connect OUTPUT B to the actuator diaphragm casing.

Double-Acting Actuators

DVC6200 digital valve controllers on double-acting actuators always use relay A. With no input current, OUTPUT A is at 0 pressure and OUTPUT B is at full supply pressure when the relay is properly adjusted. To have the actuator stem

extend from the cylinder with increasing input signal, connect OUTPUT A to the upper actuator cylinder connection. Connect OUTPUT B to the lower cylinder connection. To have the actuator stem retract into the cylinder with increasing input signal, connect OUTPUT A to the lower actuator cylinder connection. Connect OUTPUT B to the upper cylinder connection.

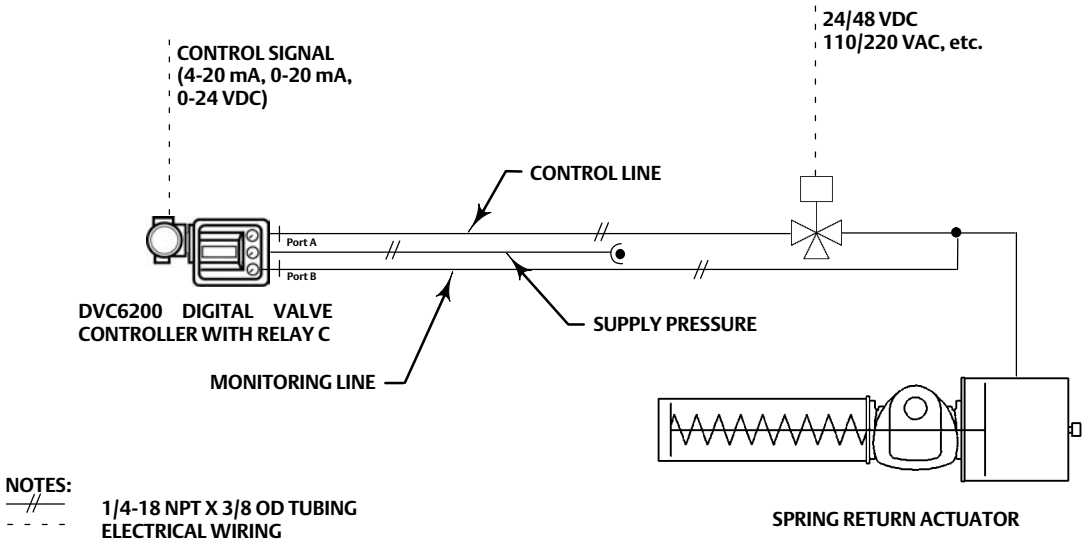
Special Construction to Support Solenoid Valve Testing

Note

Solenoid valve testing is only available for instrument level ODV.

In single-acting actuator applications with a solenoid valve installed, the DVC6200 can be configured to test the operation of the solenoid valve. This is accomplished by connecting the "unused" output port from the DVC6200 to the pneumatic line between the solenoid valve and the actuator, as shown in figure 2-22. When single-acting, direct relay C is installed, the "unused" output port is port B. When single-acting, reverse relay B is used, the unused port is port A.

Figure 2-22. Pneumatic Hookup for Solenoid Testing (Instrument Level ODV only)



Note

This application is called "special application" in the Setup Wizard relay selection.

This configuration is not possible with a double-acting actuator or when using relay A in single-acting mode.

Vent

⚠ WARNING

Personal injury or property damage can occur from cover failure due to overpressure. Ensure that the housing vent opening is open and free of debris to prevent pressure buildup under the cover.

⚠ WARNING

This unit vents the supply medium into the surrounding atmosphere. When installing this unit in a non-hazardous (non-classified) location in a confined area, with natural gas as the supply medium, you must remotely vent this unit to a safe location. Failure to do so could result in personal injury or property damage from fire or explosion, and area re-classification.

When installing this unit in a hazardous (classified) location remote venting of the unit may be required, depending upon the area classification, and as specified by the requirements of local, regional, and federal codes, rules and regulations. Failure to do so when necessary could result in personal injury or property damage from fire or explosion, and area re-classification.

Vent line piping should comply with local and regional codes, should be as short as possible with a minimum inside diameter of 12.7 mm (1/2-inch), and few bends to reduce case pressure buildup.

In addition to remote venting of the unit, ensure that all caps and covers are correctly installed. Failure to do so could result in personal injury or property damage from fire or explosion, and area re-classification.

The relay constantly bleeds a small amount of supply medium into the area under the cover. The vent opening, located below the wiring terminal box on the side of the housing, should be left open to prevent pressure buildup under the cover. If a remote vent is required, the vent lines must be as short as possible with a minimum number of bends and elbows.

To connect a remote vent, remove the plastic vent. The vent connection is 3/8 NPT. At a minimum, 12.7 mm (1/2-inch) tubing should be used when installing a remote vent to prevent excessive pressure from building up under the cover.

Wiring and Electrical Connections

⚠ WARNING

Select wiring and/or cable glands that are rated for the environment of use (such as hazardous area, ingress protection and temperature). Failure to use properly rated wiring and/or cable glands can result in personal injury or property damage from fire or explosion.

Wiring connections must be in accordance with local, regional, and national codes for any given hazardous area approval. Failure to follow the local, regional, and national codes could result in personal injury or property damage from fire or explosion.

⚠ WARNING

To avoid personal injury resulting from electrical shock, do not exceed maximum input voltage specified in table 1-2 of this quick start guide, or on the product nameplate. If the input voltage specified differs, do not exceed the lowest specified maximum input voltage.

Personal injury or property damage caused by fire or explosion may occur if this connection is attempted in a potentially explosive atmosphere or in an area that has been classified as hazardous. Confirm that area classification and atmosphere conditions permit the safe removal of the terminal box cover before proceeding.

4-20 mA Loop Connections

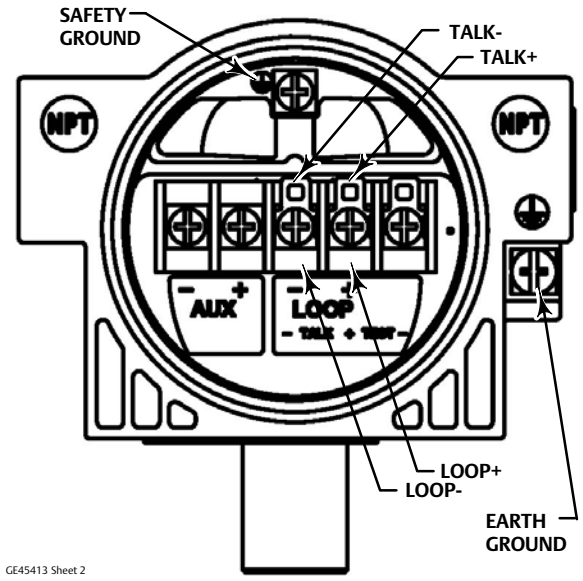
The digital valve controller is normally powered by a control system output card. The use of shielded cable will ensure proper operation in electrically noisy environments.

Note

Connect the digital valve controller to a 4-20 mA current source for operation in the point-to-point wiring mode. In the point-to-point wiring mode, the digital valve controller will not operate when connected to a voltage source.

Wire the digital valve controller as follows, refer to figure 2-23:

Figure 2-23. Loop Connections Terminal Box



1. Remove the wiring terminal box cap (refer to figure 2-20).
2. Bring the field wiring into the terminal box. When applicable, install conduit using local and national electrical codes which apply to the application.
3. Connect the control system output card positive wire “current output” to the LOOP + screw terminal in the terminal box. Connect the control system output card negative (or return) wire to the LOOP - screw terminal in the terminal box.

⚠ WARNING

Personal injury or property damage, caused by fire or explosion, can result from the discharge of static electricity. Connect a 14 AWG (2.08 mm^2) ground strap between the digital valve controller and earth ground when flammable or hazardous gases are present. Refer to national and local codes and standards for grounding requirements.

4. As shown in figure 2-23, two ground terminals are available for connecting a safety ground, earth ground, or drain wire. The safety ground is electrically identical to the earth ground. Make connections to these terminals following national and local codes and plant standards.

⚠ WARNING

To avoid static discharge from the plastic cover, do not rub or clean the cover with solvents. Clean with a mild detergent and water only.

5. Replace and hand tighten the terminal box cap. To secure the terminal box cap engage the lock screw. When the loop is ready for startup, apply power to the control system output card.

Remote Travel Sensor Connections

The DVC6205 base unit is designed to receive travel information via the Emerson Process Management supplied DVC6215 feedback unit.

⚠ WARNING

Personal injury or property damage, caused by wiring failure, can result if the feedback wiring connecting the base unit with the remote feedback unit shares a conduit with any other power or signal wiring.

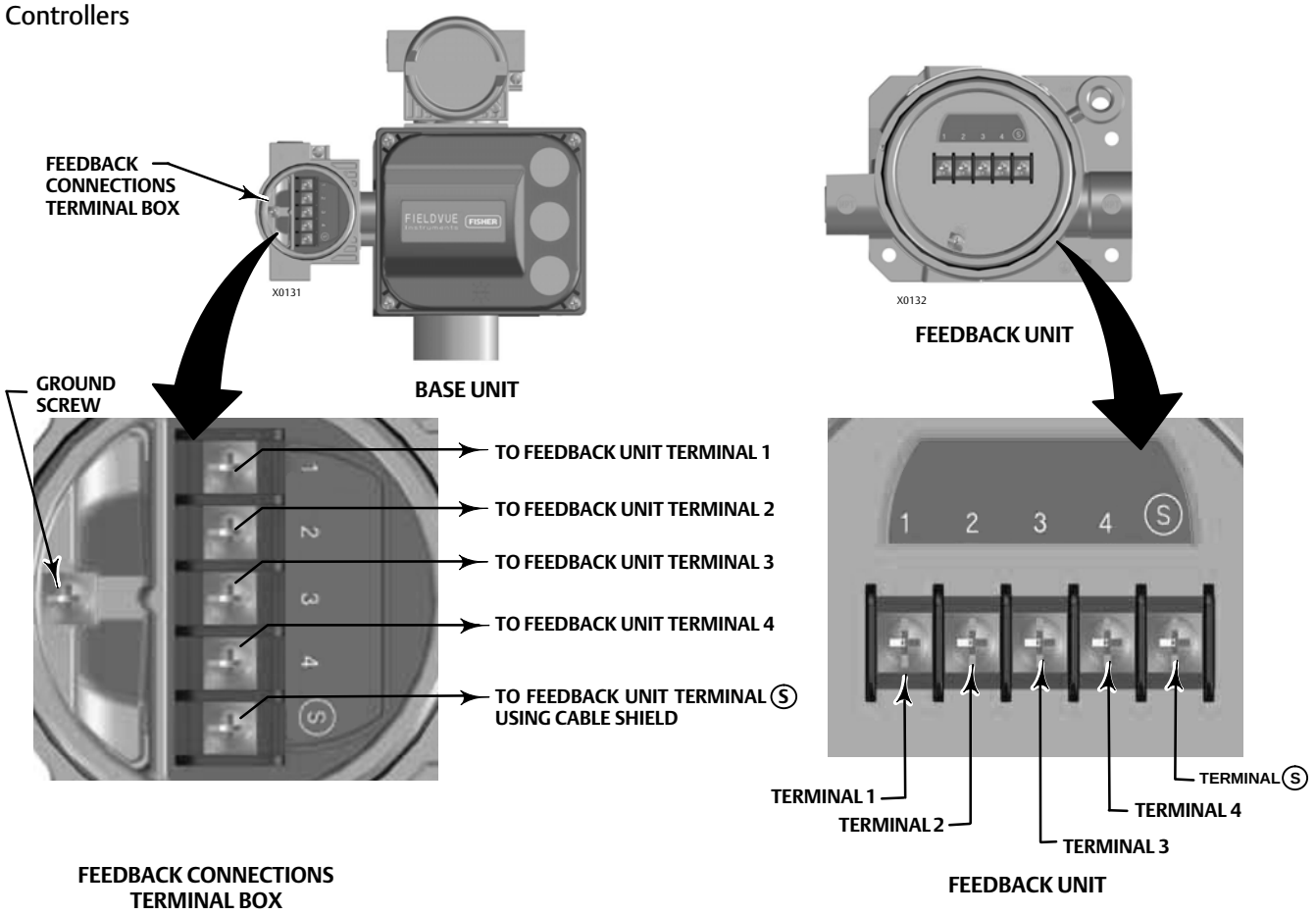
Do not place feedback wiring in the same conduit as other power or signal wiring.

Note

4-conductor shielded cable, 18 to 22 AWG minimum wire size, in rigid or flexible metal conduit, is required for connection between base unit and feedback unit. Pneumatic tubing between base unit output connection and actuator has been tested to 15 meters (50 feet) maximum without performance degradation.

1. On the feedback unit, remove the housing cap.
2. On the base unit, remove the feedback connections terminal box cap (see figure 2-20).
3. Install conduit between the feedback unit and the base unit following applicable local and national electrical codes. Route the 4-conductor shielded cable between the two units (refer to figure 2-24).
4. Connect one wire of the 4-conductor shielded cable between terminal 1 on the feedback unit and terminal 1 on the base unit.
5. Connect the second wire of the 4-conductor shielded cable between terminal 2 on the feedback unit and terminal 2 on the base unit.

Figure 2-24. Terminal Details for Connecting the Base Unit and Feedback Unit for Remote-Mounted Digital Valve Controllers



6. Connect the third wire of the 4-conductor shielded cable between terminal 3 on the feedback unit and terminal 3 on the base unit.
7. Connect the fourth wire of the 4-conductor shielded cable between terminal 4 on the feedback unit and terminal 4 on the base unit.

⚠ WARNING

The cable shield is typically not insulated. It is required that you insulate the cable shield prior to installation.

When connecting the cable shield in step 8 ensure that the uninsulated shield wiring does not contact the DVC6215 housing. Failure to do so can result in ground loop issues.

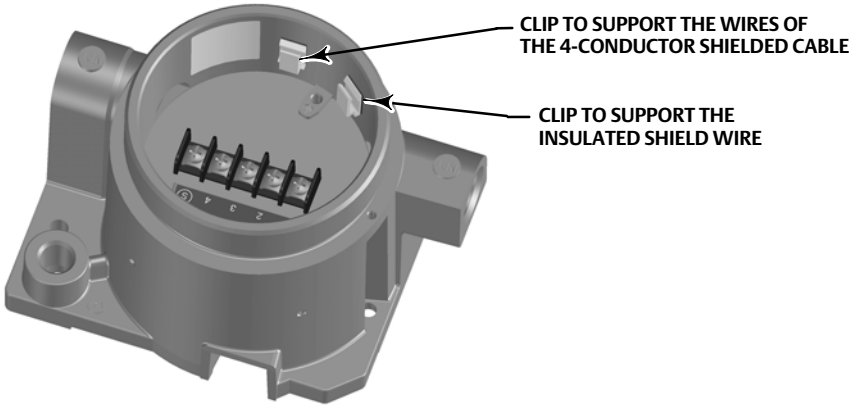
8. Connect the cable shield between terminal S on the feedback unit and terminal S on the base unit.
9. Replace and hand-tighten all covers.

CAUTION

Failure to secure the cable wires in the support clips in step 10 can result in broken wires in applications with high levels of vibration.

10. Secure the cable wires, using the support clips in the DVC6215 feedback unit (as shown in figure 2-25), to help prevent shifting and movement of the wires.

Figure 2-25. Secure Wires in Clips



Wiring Practices

Control System Requirements

There are several parameters that should be checked to ensure the control system is compatible with the DVC6200 digital valve controller.

HART Filter

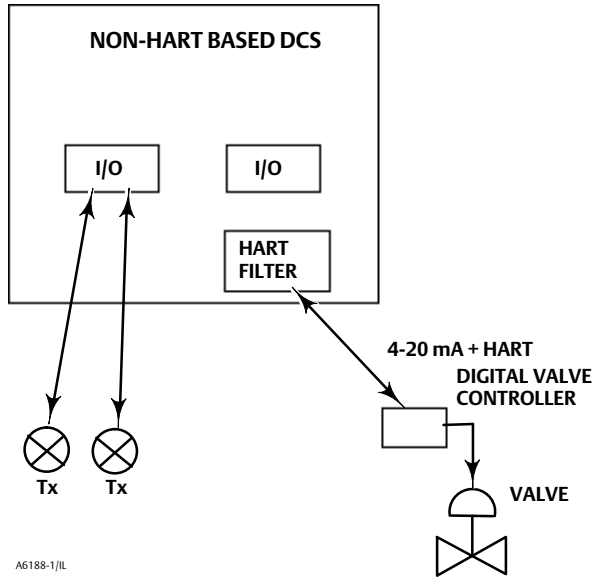
Depending on the control system you are using, a HART filter may be needed to allow HART communication. The HART filter is a passive device that is inserted in field wiring from the HART loop. The filter is normally installed near the field wiring terminals of the control system I/O (see figure 2-26). Its purpose is to effectively isolate the control system output from modulated HART communication signals and raise the impedance of the control system to allow HART communication. For more information on the description and use of the HART filter, refer to the appropriate HART filter instruction manual.

To determine if your system requires a filter contact your Emerson Process Management sales office.

Note

A HART filter is typically NOT required for any of the Emerson Process Management control systems, including PROVOX™, RS3™, and DeltaV™ systems.

Figure 2-26. HART Filter Application



Voltage Available

The voltage available at the DVC6200 digital valve controller must be at least 11 volts DC. The voltage available at the instrument is not the actual voltage measured at the instrument when the instrument is connected. The voltage measured at the instrument is limited by the instrument and is typically less than the voltage available.

As shown in figure 2-27, the voltage available at the instrument depends upon:

- the control system compliance voltage
- if a filter, wireless THUM adapter, or intrinsic safety barrier is used, and
- the wire type and length.

The control system compliance voltage is the maximum voltage at the control system output terminals at which the control system can produce maximum loop current.

The voltage available at the instrument may be calculated from the following equation:

Voltage Available = [Control System Compliance Voltage (at maximum current)] - [filter voltage drop (if a HART filter is used)] - [total cable resistance $\times$ maximum current] - [barrier resistance x maximum current].

The calculated voltage available should be greater than or equal to 11 volts DC.

Table 2-6 lists the resistance of some typical cables.

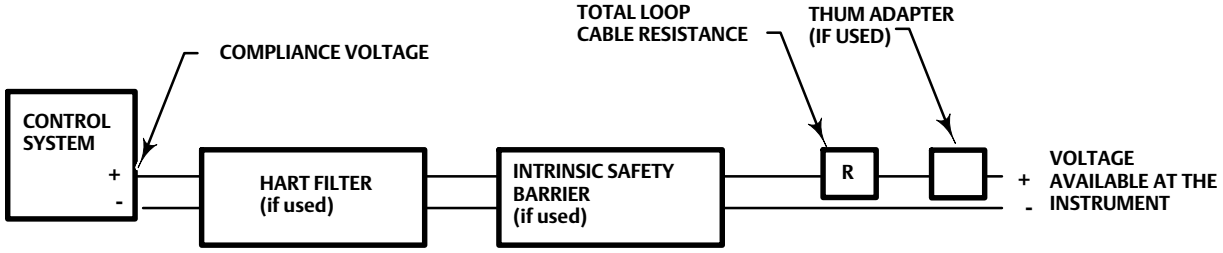
The following example shows how to calculate the voltage available for a Honeywell™ TDC2000 control system with a HF340 HART filter, and 1000 feet of Belden™ 9501 cable:

Voltage available = [18.5 volts (at 21.05 mA)] - [2.3 volts] - [48 ohms $\times$ 0.02105 amps]

Voltage available = [18.5] - [2.3] - [1.01]

Voltage available = 15.19 volts

Figure 2-27. Determining Voltage Available at the Instrument



Calculate Voltage Available at the Instrument as follows:

Example Calculation

Control system compliance voltage

18.5 volts (at 21.05 mA)

– Filter voltage drop (if used) 1

– 2.3 volts (for HF300 filter)

– Intrinsic safety barrier resistance (if used) x maximum loop current

– 2.55 volts (121 ohms x 0.02105 amps)

– Smart Wireless THUM adapter voltage drop (if used) 2

– Total loop cable resistance x maximum loop current

– 1.01 volts (48 ohms x 0.02105 amps for 1000 feet of Belden 9501 cable)

= Voltage available at the instrument 3

= 15.19 volts, available—if safety barrier (2.55 volts) is not used

NOTES:

1 **Obtain filter voltage drop. The measured drop will be different than this value. The measured filter voltage drop depends upon control system output voltage, the intrinsic safety barrier (if used), and the instrument. See note 3.**

2 **The voltage drop of the THUM adapter is linear from 2.25 volts at 3.5 mA to 1.2 volts at 25 mA.**

3 **The voltage available at the instrument is not the voltage measured at the instrument terminals. Once the instrument is connected, the instrument limits the measured voltage to approximately 9.0 to 10.5 volts.**

Table 2-6. Cable Characteristics

Cable Type	Capacitance(1) pF/Ft	Capacitance(1) pF/m	Resistance(2) Ohms/ft	Resistance(2) Ohms/m
BS5308/1, 0.5 sq mm	61.0	200	0.022	0.074
BS5308/1, 1.0 sq mm	61.0	200	0.012	0.037
BS5308/1, 1.5 sq mm	61.0	200	0.008	0.025
BS5308/2, 0.5 sq mm	121.9	400	0.022	0.074
BS5308/2, 0.75 sq mm	121.9	400	0.016	0.053
BS5308/2, 1.5 sq mm	121.9	400	0.008	0.025
BELDEN 8303, 22 awg	63.0	206.7	0.030	0.098
BELDEN 8441, 22 awg	83.2	273	0.030	0.098
BELDEN 8767, 22 awg	76.8	252	0.030	0.098
BELDEN 8777, 22 awg	54.9	180	0.030	0.098
BELDEN 9501, 24 awg	50.0	164	0.048	0.157
BELDEN 9680, 24 awg	27.5	90.2	0.048	0.157
BELDEN 9729, 24 awg	22.1	72.5	0.048	0.157
BELDEN 9773, 18 awg	54.9	180	0.012	0.042
BELDEN 9829, 24 awg	27.1	88.9	0.048	0.157
BELDEN 9873, 20 awg	54.9	180	0.020	0.069

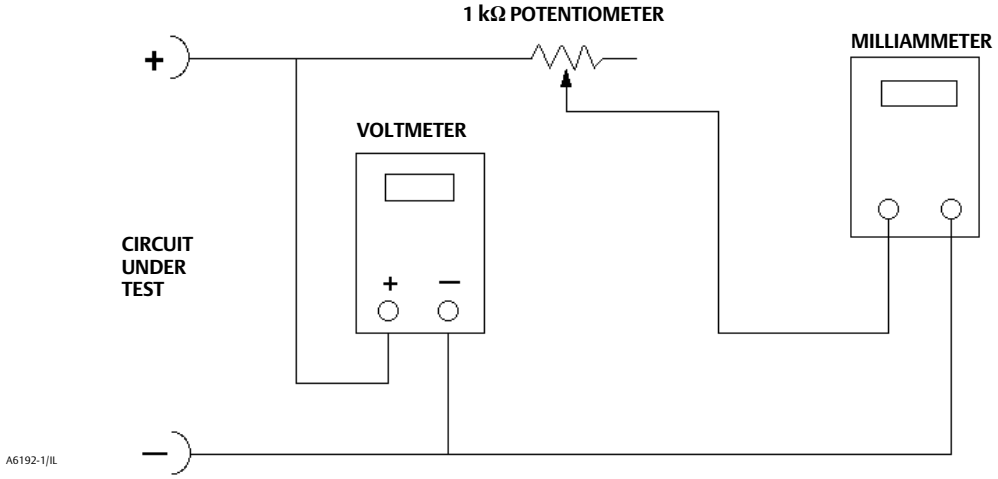
1. The capacitance values represent capacitance from one conductor to all other conductors and shield. This is the appropriate value to use in the cable length calculations.
2. The resistance values include both wires of the twisted pair.

Compliance Voltage

If the compliance voltage of the control system is not known, perform the following compliance voltage test.

1. Disconnect the field wiring from the control system and connect equipment as shown in figure 2-28 to the control system terminals.

Figure 2-28. Voltage Test Schematic



2. Set the control system to provide maximum output current.
3. Increase the resistance of the 1 kΩ potentiometer, shown in figure 2-28, until the current observed on the milliammeter begins to drop quickly.
4. Record the voltage shown on the voltmeter. This is the control system compliance voltage.

For specific parameter information relating to your control system, contact your Emerson Process Management sales office.

Maximum Cable Capacitance

The maximum cable length for HART communication is limited by the characteristic capacitance of the cable. Maximum length due to capacitance can be calculated using the following formulas:

Length(ft) = [160,000 - C_{master}(pF)] ÷ [C_{cable}(pF/ft)]

Length(m) = [160,000 - C_{master}(pF)] ÷ [C_{cable}(pF/m)]

where:

160,000 = a constant derived for FIELDVUE instruments to ensure that the HART network RC time constant will be no greater than 65 µs (per the HART specification).

C_{master} = the capacitance of the control system or HART filter

C_{cable} = the capacitance of the cable used (see table 2-6)

The following example shows how to calculate the cable length for a Foxboro™ I/A control system (1988) with a C_{master} of 50, 000 pF and a Belden 9501 cable with characteristic capacitance of 50pF/ft.

Length(ft) = [160,000 - 50,000pF] ÷ [50pF/ft]

Length = 2200 ft.

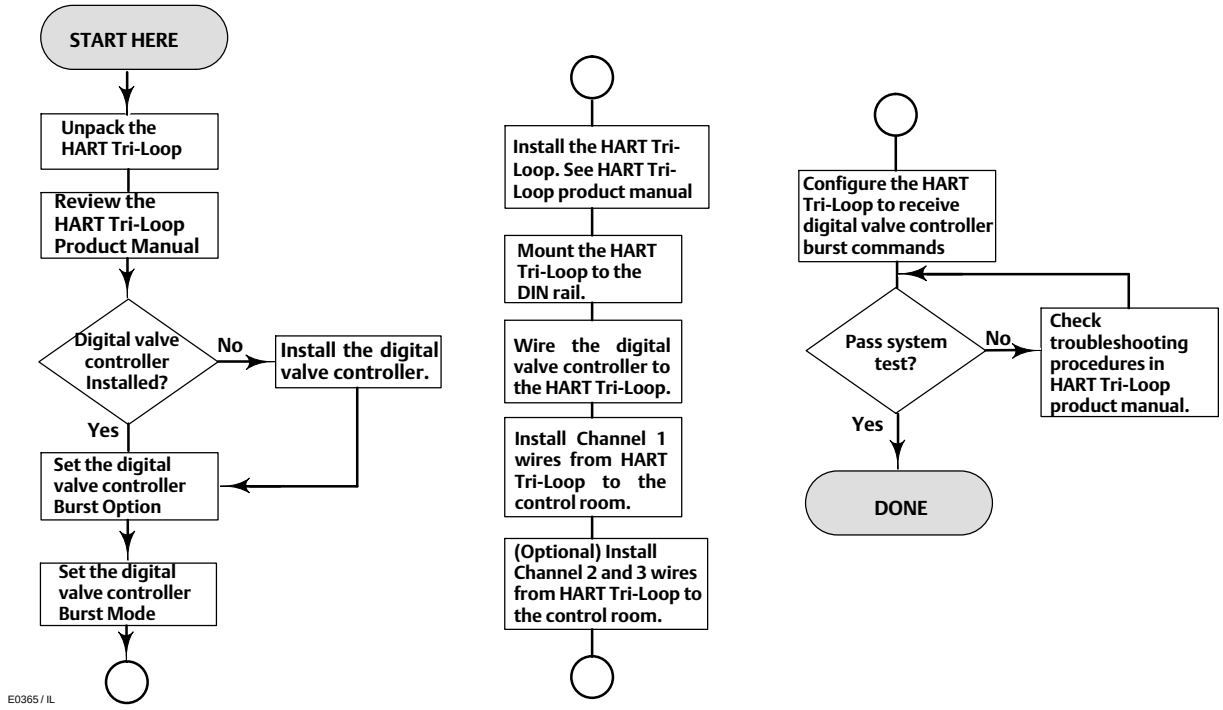
The HART communication cable length is limited by the cable characteristic capacitance. To increase cable length, select a wire with lower capacitance per foot. Contact your Emerson Process Management sales office for specific information relating to your control system.

Installation in Conjunction with a Rosemount 333 HART Tri-Loop HART-to-Analog Signal Converter

Use the DVC6200 digital valve controller in operation with a Rosemount 333 HART Tri-Loop HART-to-Analog Signal Converter to acquire an independent 4-20 mA analog output signal for the analog input, travel target, pressure, or travel. The HART Tri-Loop accepts any three of these digital signals and converts them into three separate 4-20 mA analog channels.

Refer to figure 2-29 for basic installation information. Refer to the 333 HART Tri-Loop HART-to-Analog Signal Converter Product Manual for complete installation information.

Figure 2-29. HART Tri-Loop Installation Flowchart


START HERE
Unpack the HART Tri-Loop
Review the HART Tri-Loop Product Manual
Digital valve controller Installed?
No
Install the digital valve controller.
Yes
Set the digital valve controller Burst Option
Set the digital valve controller Burst Mode
E0365 / IL
Install the HART Tri-Loop. See HART Tri-Loop product manual
Mount the HART Tri-Loop to the DIN rail.
Wire the digital valve controller to the HART Tri-Loop.
Install Channel 1 wires from HART Tri-Loop to the control room.
(Optional) Install Channel 2 and 3 wires from HART Tri-Loop to the control room.
Configure the HART Tri-Loop to receive digital valve controller burst commands
Pass system test?
No
Check troubleshooting procedures in HART Tri-Loop product manual.
Yes
DONE

Commissioning the Digital Valve Controller for use with the HART Tri-Loop Signal Converter

To prepare the digital valve controller for use with a 333 HART Tri-Loop, you must configure the digital valve controller to burst mode, and select Burst Command 3. In burst mode, the digital valve controller provides digital information to

the HART Tri-Loop HART-to-Analog Signal Converter. The HART Tri-Loop converts the digital information to a 4 to 20 mA analog signal. Each burst message contains the latest value of the primary (analog input), secondary (travel target), tertiary (configured output pressure), and quaternary (travel) variables.

To commission a DVC6200 for use with a HART Tri-Loop, perform the following procedures.

Note

Instrument level AC does not support HART Command 3 or Burst Mode communications.

Set the Burst Operation

Field Communicator	Configure / Setup > Detailed Setup > Mode and Protection > Burst Mode (1-2-1-4)

1. Select *Burst Enable.* Select *Enable* then press ENTER and SEND.
2. Select *Burst Command.* Select the desired command (HART Univ Command 3).
3. Select *Cmd 3(Trending)Press*. Select the pressure you desire the HART Tri-Loop to use as the tertiary variable.

Command 3 provides the following variables:

Primary variable—analog input in % off mA,

Secondary variable—travel target in % of ranged travel,

Tertiary variable—supply or output pressure in psig, bar, kPa, or kg/cm^2. Select *Cmd 3 Press* from the *Burst* menu to select if the output A, output B, differential (A-B), or supply pressure is sent.

Quaternary variable—travel in % of ranged travel.

Section 3 Basic Setup

Instrument Mode

Field Communicator	Hot Key > Instrument Mode (Hot Key-1)
	Configure / Setup > Detailed Setup > Mode and Protection > Instrument Mode (1-2-1-1)

To setup and calibrate the instrument, the instrument mode must be *Out Of Service*.

If the mode is not *Out Of Service*, select *Out Of Service* from the *Instrument Mode* menu and press ENTER.

Configuration Protection

Field Communicator	Hot Key > Protection (Hot Key-3)
	Configure / Setup > Detailed Setup > Mode and Protection > Protection (1-2-1-5)

To setup and calibrate the instrument, the protection must be set to *None* with the Field Communicator. If the protection is not *None*, changing the protection requires placing a jumper across the Auxiliary terminals in the terminal box.

To remove protection:

1. Connect a 4-20 mA source to the instrument.
2. Connect the Field Communicator to the instrument and turn it on.
3. Press the Hot Key on the Field Communicator and select *Protection.*

Note

If the Aux Terminal Mode is configured for Auto Calibration, be sure the jumper remains across the auxiliary terminals until the Field Communicator prompts you to remove it. Removing the jumper too soon will cause the instrument to begin auto calibration.

Auto calibration can be terminated by shorting the Aux Terminals for one second.

⚠ WARNING

If the jumper is removed too soon, and auto calibration begins, the valve will move full stroke. To avoid personal injury and property damage caused by the release of pressure or process fluid, isolate the valve from the process and equalize pressure on both sides of the valve or bleed off the process fluid.

4. From the *Protection* menu, select *None.* When prompted by the Field Communicator, temporarily attach the jumper to the AUX + and AUX - terminals in the instrument terminal box.
5. Remove the jumper from the AUX terminals when prompted.

Basic Setup

Field Communicator	Configure / Setup > Basic Setup (1-1)

⚠ WARNING

Changes to the instrument setup may cause changes in the output pressure or valve travel. Depending on the application, these changes may upset process control, which may result in personal injury or property damage.

Note

To setup and calibrate the instrument, the protection must be *None* and the Instrument Mode must be *Out Of Service*. See Configuration Protection and Instrument Mode at the beginning of this section for information on removing instrument protection and changing the instrument mode.

If you are operating in burst mode, we recommend that you disable burst before continuing with calibration. Once calibration is complete, burst mode may then be turned back on.

When the DVC6200 digital valve controller is ordered as part of a control valve assembly, the factory mounts the digital valve controller and sets up the instrument as specified on the order. When mounting to a valve in the field, the instrument needs to be set up to match the instrument to the valve and actuator.

Before beginning Basic Setup, be sure the instrument is correctly mounted as described in the Installation section.

Setup Wizard

Field Communicator	Configure / Setup > Basic Setup > Setup Wizard (1-1-1)

Follow the prompts on the Field Communicator display to automatically setup the instrument using specified actuator information. Table 4-4 provides the actuator information required to setup and calibrate the instrument.

1. Enter the instrument family; select DVC6200.
2. Select travel or pressure control. Travel control is the typical mode of operation. Refer to page 56 for additional information on setting Travel/Pressure Control.
3. Enter the pressure units: psi, bar, kPa, or kg/cm^2.
4. Enter the maximum instrument supply pressure.

After entering the maximum instrument supply pressure, the Setup Wizard prompts you for actuator information.

5. Enter the manufacturer of the actuator on which the instrument is mounted. If the actuator manufacturer is not listed, select Other.
6. Enter the actuator model or type. If the actuator model is not listed, select Other.
7. Enter the actuator size.
8. Select whether the valve is open or closed under the zero power condition.
9. Specify if a volume booster or quick release valve is present.
10. Specify if factory defaults should be used for Basic Setup. If you select YES for factory default, the Field Communicator sets the setup parameters to the values listed in table 3-1. If you select NO for the factory defaults, the setup parameters listed in the table remain at their previous settings.

Table 3-1. Factory Default Settings

Setup Parameter	Default Setting
Analog Input Units	mA
Analog In Range High	20.0 mA
Analog In Range Low	4.0 mA
Control Mode	Analog (Digital if Multidrop)
Restart Control Mode	Resume Last
Self-Test Shutdown	All Failures Disabled
Setpoint Filter Time	Filter Off
Input Characteristic	Linear
Travel Limit High	125%
Travel Limit Low	-25%
Travel Cutoff High	99.5%
Travel Cutoff Low	0.5%
Minimum Opening Time	0 secs
Minimum Closing Time	0 secs
Polling Address	0
Command 3 Pressure	
For double-acting actuators	differential output pressure
For single-acting actuators	actuator pressure

Typically the Setup Wizard determines the required setup information based upon the actuator manufacturer and model specified. However, if you enter *other* for the actuator manufacturer or the actuator model, then you will be prompted for setup parameters such as:
Actuator style (spring & diaphragm, piston double-acting without spring, piston single-acting with spring, piston double-acting with spring),
Valve style (rotary or sliding-stem),
On Loss of Instrument Signal (valve opens or closes), see Zero Power Condition on page 70.

⚠ WARNING

If you answer YES to the prompt for permission to move the valve when the Setup Wizard is determining the travel sensor motion, the instrument will move the valve through its full travel range. To avoid personal injury and property damage caused by the release of pressure or process fluid, isolate the valve from the process and equalize pressure on both sides of the valve or bleed off the process fluid.

Travel Sensor motion (increasing or decreasing air pressure causes the magnet assembly to move up or down or the rotary shaft to turn clockwise or counterclockwise) The Setup Wizard asks if it can move the valve to determine travel sensor motion. If you answer Yes, the instrument will stroke the valve the full travel span to determine travel sensor motion. If you answer No, then you must specify the direction of travel movement. For quarter-turn actuators determine rotation by viewing the rotation of the magnet assembly from the back of the instrument (see Travel Sensor Motion on page 71).
Volume booster (indicate if volume booster or quick release valve is present)
Tuning set (see Tuning Set in the Detailed Setup section).

Note

Travel Sensor Motion in this instance refers to the motion of the magnet assembly. Note that the magnet assembly may be referred to as a magnetic array in user interface tools.

After completing the setup information, you will be prompted to run auto calibration. Follow the prompts on the Field Communicator display. The calibration procedure uses the valve and actuator stops as the 0% and 100% calibration points. For additional information, refer to Auto Calibration on page 76.

If a double-acting relay is used, you will be prompted to run the relay adjustment when auto calibration is selected. Select Yes to adjust the relay. For additional information refer to Relay Adjustment on page 81.

If after completing the Setup Wizard the valve seems slightly unstable or unresponsive, you can improve operation by selecting either *Performance Tuner* or *Stabilize/Optimize*.

Performance Tuner

Field Communicator	Configure / Setup > Basic Setup > Performance Tuner (1-1-2)

Note

The Performance Tuner is available for instrument level AD, PD, and ODV.

⚠ WARNING

During performance tuning the valve may move, causing process fluid or pressure to be released. To avoid personal injury and property damage caused by the release of process fluid or pressure, isolate the valve from the process and equalize pressure on both sides of the valve or bleed off the process fluid.

The Performance Tuner is used to optimize digital valve controller tuning. It can be used with digital valve controllers mounted on most sliding-stem and rotary actuators, including Fisher and other manufacturers' products. Moreover, because the Performance Tuner can detect internal instabilities before they become apparent in the travel response, it can generally optimize tuning more effectively than manual tuning. Typically, the Performance Tuner takes 3 to 5 minutes to tune an instrument, although tuning instruments mounted on larger actuators may take longer.

Access Performance Tuner by selecting *Performance Tuner* from the *Basic Setup* menu. Follow the prompts on the Field Communicator display to optimize digital valve controller tuning.

Stabilizing/Optimizing Valve Response

Field Communicator	Hot Key > Stabilize/Optimize (Hot Key-4)
	Instrument level HC only Configure / Setup > Basic Setup > Stabilize/Optimize (1-1-2)

Note

Stabilize/Optimize is available for instrument level HC, AD, PD, and ODV.

⚠ WARNING

During Stabilize/Optimize the valve may move, causing process fluid or pressure to be released. To avoid personal injury and property damage caused by the release of process fluid or pressure, isolate the valve from the process and equalize pressure on both sides of the valve or bleed off the process fluid.

If after completing setup and calibration the valve seems slightly unstable or unresponsive, you can improve operation by pressing the Hot Key and selecting *Stabilize/Optimize,* or select *Stabilize/Optimize* from the *Basic Setup* menu (for instrument level HC only). *Stabilize/Optimize* can be accessed through the *Detailed Setup* menu for instrument level AD, PD, and ODV.

Stabilize/Optimize permits you to adjust valve response by changing the digital valve controller

If the valve is unstable, select *Decrease Response* to stabilize valve operation. This selects the next lower tuning set (e.g., F to E). If the valve response is sluggish, select *Increase Response* to make the valve more responsive. This selects the next higher tuning set (e.g., F to G).

If after selecting *Decrease Response* or *Increase Response* the valve travel overshoot is excessive select *Decrease Damping* to select a damping value that allows more overshoot. Select *Increase Damping* to select a damping value that will decrease the overshoot. When finished, select *Done*.

Section 4 Detailed Setup

Detailed Setup

Field Communicator	Configure / Setup > Detailed Setup (1-2)

Note

Detailed Setup is available for instrument level HC, AD, PD, and ODV.

Detailed Setup allows you to configure the digital valve controller to your application. Table 4-1 lists the default settings for a standard factory configuration. You can adjust actuator response, set the various modes, alerts, ranges, travel cutoffs and limits. You can also restart the instrument and set the protection.

Table 4-1. Default Detailed Setup Parameters

Setup Parameter		Default Setting(1)
Instrument Configuration	Control Mode	Analog
	Restart Control Mode	Resume Last
	Zero Power Condition	Valve Open(2)
	Analog In Range Low	4 mA
	Analog In Range High	20 mA
	Analog Input Units	mA
	Feedback Connection	Rotary - All(2)
	Travel Sensor Motion	CW/To Bottom Inst.(2)
	Auxiliary Terminal Mode	Disabled
	Max Supply Pressure	20(2)
	Pressure Units	PSI(3)
	Temperature Units	F(3)
	Polling Address	0
	Burst Mode Enable	No
	Burst Command	3
	Cmd 3 (Trending) Pressure	A-B
Dynamic Response and Tuning	Tuning Set	F(2)
	Input Characterization	Linear
	Travel Limit High	125%
	Travel Limit Low	-25%
	Travel/Pressure Cutoff High	99.46%
	Travel/Pressure Cutoff Low	0.50%
	Set Point Rate Open	0%/sec
	Set Point Rate Close	0%/sec
	Set Point Filter Lag Time	0 sec
	Integrator Enable	Yes
	Integral Gain	9.4 repeats/minute
	Integral Deadzone	0.26%

-continued on next page-

Table 4-1. Default Detailed Setup Parameters (continued)

Setup Parameter		Default Setting[1]
Travel History Alerts	Cycle Counter Alert Enable	No
	Cycle Counter Alert Deadband	1%
	Cycle Counter Alert Point	1000000
	Travel Accumulator Alert Enable	No
	Travel Accumulator Deadband	1%
	Travel Accumulator Alert Point	1000000
Deviation & Other Alerts	Travel Deviation Alert Enable	Yes
	Travel Deviation Alert Point	5%
	Travel Deviation Time	9.99 sec
	Pressure Deviation Alert Enable	Yes
	Pressure Deviation Alert Point	5 psi[3]
	Pressure Deviation Alert Time	9.99 sec
	Drive Signal Alert Enable	Yes
	Supply Pressure Alert Enable	Yes
	Supply Pressure Alert Point	19 psi[3]
Travel Alerts	Travel Alert Lo Enable	No
	Lo Point	-25%
	Travel Alert Hi Enable	No
	Hi Point	125%
	Travel Alert Lo Lo Enable	No
	Lo Lo Point	-25%
	Travel Alert Hi Hi Enable	No
	Hi Hi Point	125%
	Deadband	5%
Electronics Alerts	Shutdown Activated	Yes
	Power Starvation Alert Enable	No
	Non-Critical NVM Alert Enable	No
Informational Status	Instrument Time Invalid Enable	Yes
	Calibration in Progress Enable	No
	Autocalibration in Progress Enable	No
	Diagnostics in Progress Enable	No
	Diagnostics Data Available Enable	Yes
	Integrator Saturated Hi Enable	Yes
	Integrator Saturated Lo Enable	Yes
	Pressure Control Active Enable	Yes
	Multi-Drop Alert Enable	No
Alert Record	Valve Alerts Enable	Yes
	Failure Alerts Enable	Yes
	Misc Alerts Enable	No
	Alert Record Not Empty Enable	Yes
	Alert Record Full Enable	Yes

1. The settings listed are for standard factory configuration. DVC6200 instruments can also be ordered with custom configuration settings. For the default custom settings, refer to the order requisition.
2. If the instrument is shipped mounted on an actuator, these values depend upon the actuator on which the instrument is mounted.
3. U.S. Factory defaults only.

Mode and Protection

Mode

Instrument Mode

Field Communicator	Hot Key > Instrument Mode (Hot Key-1)
	Configure / Setup > Detailed Setup > Mode and Protection > Instrument Mode (1-2-1-1)

Instrument Mode allows you to either take the instrument Out Of Service or place it In Service. Taking the instrument Out Of Service allows you to perform instrument calibration and also allows you to change setup variables that affect control, provided the calibration/configuration protection is properly set. See Setting Protection.

Note

Some changes that require the instrument to be taken Out Of Service will not take effect until the instrument is placed back In Service or the instrument is restarted.

Control Mode

Field Communicator	Hot Key > Instrument Mode (Hot Key-2)
	Configure / Setup > Detailed Setup > Mode and Protection > Instrument Mode (1-2-1-2)

Control Mode lets you define where the instrument reads its set point. Follow the prompts on the Field Communicator display to choose one of the following control modes: Analog or Digital.

Choose Analog if the instrument is to receive its set point over the 4-20 mA loop. Normally the instrument control mode is Analog.

Choose Digital if the instrument is to receive its set point digitally, via the HART communications link.

A third mode, Test, is also displayed. Normally the instrument should not be in the Test mode. The Field Communicator automatically switches to this mode whenever it needs to stroke the valve during calibration or stroke valve, for example. However, if you abort from a procedure where the instrument is in the Test mode, it may remain in this mode. To take the instrument out of the Test mode, select *Control Mode* then select either Analog or Digital.

Restart Control Mode

Field Communicator	Configure / Setup > Detailed Setup > Mode and Protection > Restart Ctrl Mode (1-2-1-3)

Restart Control Mode lets you choose which operating mode you want the instrument to be in after a restart. Follow the prompts on the Field Communicator display to define the restart control mode as Resume Last, Analog, or Digital.

Burst Mode

Field Communicator	Configure / Setup > Detailed Setup > Mode and Protection > Burst Mode (1-2-1-4)

Enabling burst mode provides continuous communication from the digital valve controller. Burst mode applies only to the transmission of burst mode data (analog input, travel target, pressure, and travel) and does not affect the way other data is accessed.

Access to information in the instrument is normally obtained through the poll/response of HART communication. The Field Communicator or the control system may request any of the information that is normally available, even while

the instrument is in burst mode. Between each burst mode transmission sent by the instrument, a short pause allows the Field Communicator or control system to initiate a request. The instrument receives the request, processes the response message, and then continues "bursting" the burst mode data.

- *Burst Enable*—Yes or no. Burst mode must be enabled before you can change the burst mode command.
- *Burst Command*—There are four burst mode commands. Command 3 is recommended for use with the 333 HART Tri-Loop HART-to-analog signal converter. The other three are not used at this time.
- *Cmd 3(Trending)Press*—Command 3 provides the following variables:

Primary variable—analog input in % or mA,

Secondary variable—travel target in % of ranged travel,

Tertiary variable—supply or output pressure in psig, bar, kPa, or kg/cm^2. Select *Select Cmd 3 Press* from the *Burst* menu to select if the output A, output B, differential (A-B), or supply pressure is sent.

Quaternary variable—travel in % of ranged travel.

Protection

Protection

Field Communicator	Hot Key > Protection (Hot Key-3)
	Configure / Setup > Detailed Setup > Mode and Protection > Protection (1-2-1-5)

Some setup parameters may require changing the protection with the Field Communicator. To remove protection (change protection to *None*) requires placing a jumper across the auxiliary terminals in the terminal box in order to change protection.

Note

If the Aux Terminal Mode is configured for Auto Calibration, be sure the jumper remains across the auxiliary terminals until the Field Communicator prompts you to remove it. Removing the jumper too soon will cause the instrument to begin auto calibration.

Auto calibration can be terminated by shorting the auxiliary terminals for one second.

⚠ WARNING

If the jumper is removed too soon, and auto calibration begins, the valve will move full stroke. To avoid personal injury and property damage caused by the release of pressure or process fluid, isolate the valve from the process and equalize pressure on both sides of the valve or bleed off the process fluid.

Two levels of protection are available:

- *Config & Calib*—Both setup and calibration are protected. Prohibits changing calibration and protected setup parameters.
- *None*—Neither setup nor calibration is protected. Allows changing calibration and setup parameters.

Table 4-2 lists configurable parameters in the instrument and the requirements for modifying these parameters, in terms of instrument mode and protection.

Select the desired level of protection. Follow the prompts on the Field Communicator display to set the protection level. If necessary, temporarily attach the jumper to the AUX + and AUX - terminals in the instrument terminal box when prompted by the Field Communicator.

Table 4-2. Conditions for Modifying FIELDVUE DVC6200 Digital Valve Controller Parameters

Parameters	In Service/ Config Protected	In Service/ Config Unprotected	Out of Service/ Config Protected	Out of Service/ Config Unprotected
Control Mode	✓	✓	✓	✓
Restart Ctrl Mode	---	---	---	✓
Burst Mode Enable	✓	✓	✓	✓
Burst Mode Command	---	✓	---	✓
Protection	✓	✓	✓	✓
HART Tag	---	✓	---	✓
Message	---	✓	---	✓
Descriptor	---	✓	---	✓
Date	---	✓	---	✓
Valve Serial Num	---	✓	---	✓
Inst Serial Num	---	✓	---	✓
Polling Address	---	---	---	✓
Relay Type	---	---	---	✓
Max Supply Pressure	---	---	---	✓
Actuator Style	---	---	---	✓
Feedback Connection	---	---	---	✓
Travel Sensor Motion	---	---	---	✓
Valve Style	---	---	---	✓
Zero Ctrl Signal	---	---	---	✓
Analog In Units	---	---	---	✓
Input Range High	---	---	---	✓
Input Range Low	---	---	---	✓
Pressure Units	---	---	---	✓
Temp Units	✓	✓	✓	✓
Tuning Set	---	✓	---	✓
Prop Gain	---	✓	---	✓
Velocity Gain	---	✓	---	✓
MLFB Gain	---	✓	---	✓
Input Char	---	---	---	✓
Define Custom Char	---	---	---	✓
Set Pt Filter Time	---	---	---	✓
Tvl Limit High	---	---	---	✓
Tvl Limit Low	---	---	---	✓
Tvl Cutoff High	---	---	---	✓
Tvl Cutoff Low	---	---	---	✓
Set Point Rate Open	---	---	---	✓
Set Point Rate Close	---	---	---	✓
Tvl Hi/Lo Enab	✓	✓	✓	✓
Tvl HH/LL Enab	✓	✓	✓	✓
Tvl Alert Hi Pt	✓	✓	✓	✓
Tvl Alert Lo Pt	✓	✓	✓	✓
Tvl Alert HiHi Pt	✓	✓	✓	✓
Tvl Alert LoLo Pt	✓	✓	✓	✓
Tvl Alrt DB	✓	✓	✓	✓
Tvl Dev Alrt Enab	✓	✓	✓	✓
Tvl Dev Alrt Pt	✓	✓	✓	✓
Tvl Dev Time	✓	✓	✓	✓

✓—indicates parameter may be modified for instrument mode and protection shown.

-Continued-

Table 4-2. Conditions for Modifying FIELDVUE DVC6200 Digital Valve Controller Parameters (continued)

Parameters	In Service/ Config Protected	In Service/ Config Unprotected	Out of Service/ Config Protected	Out of Service/ Config Unprotected
Cycl Cnt Alrt Enab	✓	✓	✓	✓
Cycl Count Alrt Pt	✓	✓	✓	✓
Cycl Count DB	✓	✓	✓	✓
Cycl Count	✓	✓	✓	✓
Tvl Acum Alrt Enab	✓	✓	✓	✓
Tvl Acum Alrt Pt	✓	✓	✓	✓
Tvl Acum DB	✓	✓	✓	✓
Tvl Acum	✓	✓	✓	✓
Aux Terminal Mode	---	---	---	✓
Aux In Alrt Enab	✓	✓	✓	✓
Aux In Alrt State	✓	✓	✓	✓
Drive Alrt Enab	✓	✓	✓	✓
Supply Press Alrt	✓	✓	✓	✓
Flash ROM Fail	---	---	---	✓
Ref Voltage Fail	---	---	---	✓
Drive Current Fail	---	---	---	✓
Critical NVM Fail	---	---	---	✓
Temp Sensor Fail	---	---	---	✓
Press Sensor Fail	---	---	---	✓
Tvl Sensor Fail	---	---	---	✓

✓—indicates parameter may be modified for instrument mode and protection shown.

Response Control

Field Communicator	Configure / Setup > Detailed Setup > Response Control (1-2-2)

Follow the prompts on the Field Communicator display to configure the following response control parameters: *Tuning, Travel/Pressure Control, Input Characterization, Define Custom Characterization,* and *Dynamic Response*.

Tuning

Field Communicator	Configure / Setup > Detailed Setup > Response Control > Tuning (1-2-2-1)

Travel Tuning

⚠ WARNING

Changes to the tuning set may cause the valve/actuator assembly to stroke. To avoid personal injury and property damage caused by moving parts, keep hands, tools, and other objects away from the valve/actuator assembly.

- Tvl Tuning Set

Tvl Tuning Set—There are eleven Travel Tuning Sets to choose from. Each tuning set provides a preselected value for the digital valve controller gain settings. Tuning set C provides the slowest response and M provides the fastest response.

Table 4-3 lists the proportional gain, velocity gain and minor loop feedback gain values for preselected tuning sets.

Table 4-3. Gain Values for Preselected Travel Tuning Sets

Tuning Set	Proportional Gain	Velocity Gain	Minor Loop Feedback Gain
C	4.4	3.0	35
D	4.8	3.0	35
E	5.5	3.0	35
F	6.2	3.1	35
G	7.2	3.6	34
H	8.4	4.2	31
I	9.7	4.85	27
J	11.3	5.65	23
K	13.1	6.0	18
L	15.5	6.0	12
M	18.0	6.0	12
X (Expert)	User Adjusted	User Adjusted	User Adjusted

In addition, you can specify Expert tuning and individually set the proportional gain, velocity gain, and minor loop feedback gain. Individually setting or changing any tuning parameter will automatically change the tuning set to X (expert).

Note

Use Expert tuning only if standard tuning has not achieved the desired results.

Stabilize/Optimize or Performance Tuner may be used to achieve the desired results more rapidly than Expert tuning.

Table 4-4 provides tuning set selection guidelines for Fisher and Baumann actuators. These tuning sets are only recommended starting points. After you finish setting up and calibrating the instrument, you may have to select either a higher or lower tuning set to get the desired response. You can use the Performance Tuner to optimize tuning.

For an actuator not listed in the tables, you can estimate a starting tuning set by calculating the casing or cylinder volume. Then, in the tables, find an actuator with the closest equivalent volume and use the tuning set suggested for that actuator.

Tvl Prop Gain—Travel Proportional Gain is the proportional gain for the travel control tuning set. Changing this parameter will also change the tuning set to Expert.

Tvl Velocity Gain—Travel Velocity Gain is the velocity gain for the travel control tuning set. Changing this parameter will also change the tuning set to Expert.

Tvl MLFB Gain—Travel MLFB Gain is the minor loop feedback gain for the travel control tuning set. Changing this parameter will also change the tuning set to Expert.

- Tvl Integ Enable—Yes or No. Enable the integral setting to improve static performance by correcting for error that exists between the travel target and actual travel. Travel Integral Control is enabled by default.
- Tvl Integ Gain—Travel Integral Gain is the ratio of the change in output to the change in input, based on the control action in which the output is proportional to the time integral of the input.
- Stabilize/Optimize—Stabilize/Optimize permits you to adjust valve response by changing the digital valve controller tuning.

If the valve is unstable, select *Decrease Response* to stabilize valve operation. This selects the next lower tuning set (e.g., F to E). If the valve response is sluggish, select *Increase Response* to make the valve more responsive. This selects the next higher tuning set (e.g., F to G).

If after selecting *Decrease Response* or *Increase Response* the valve travel overshoot is excessive, select *Decrease Damping* to select a damping value that allows more overshoot. Select *Increase Damping* to select a damping value that will decrease the overshoot. When finished, select *done.*

Table 4-4. Actuator Information for Initial Setup

Actuator Manufacturer	Actuator Model	Actuator Size	Actuator Style	Starting Tuning Set	Travel Sensor Motion(2) Relay A or C(3)	
Fisher	585C & 585CR	25 50, 60 60, 80 100, 130	Piston Dbl w/ or w/o Spring. See actuator instruction manual and nameplate.	F J L M	User Specified	
	657	30 34, 40 45, 50 46, 60, 70, 76, & 80-100	Spring & Diaphragm	H K L M	Away from the top of the instrument	
	667	30 34, 40 45, 50 46, 60, 70, 76, & 80-100	Spring & Diaphragm	H K L M	Towards the top of the instrument	
	1051 & 1052	20, 30 33 40 60, 70	Spring & Diaphragm (Window-mount)	H I K M	Away from the top of the instrument	
	1061	30 40 60 68, 80, 100, 130	Piston Dbl w/o Spring	J K L M	Depends upon pneumatic connections. See description for Travel Sensor Motion	
	1066	20, 27, 75	Piston Dbl w/o Spring	Specify	Depends upon pneumatic connections. See description for Travel Sensor Motion	
	1066SR	20 27, 75	Piston Sgl w/Spring	G L	Mounting Style	Travel Sensor Motion
					A	Away from the top of the instrument
					B	Towards the top of the instrument
					C	Towards the top of the instrument
					D	Away from the top of the instrument
	2052	1 2 3	Spring & Diaphragm (Window-mount)	H J M	Away from the top of the instrument	
	3024	GA 1.21 GA 1.31 GA 1.41	Spring & Diaphragm	E H K	For P_o operating mode (air opens): Towards the top of the instrument For P_s operating mode (air closes): Away from the top of the instrument	
	GX	225	Spring & Diaphragm	X(1)	Air to Open Towards the top of the instrument	Air to Close Away from the top of the instrument
		750		K		
		1200		M		
Baumann	Air to Extend	16 32 54	Spring & Diaphragm	C E H	Towards the top of the instrument	
	Air to Retract				Away from the top of the instrument	
	Rotary	10 25 54		E H J	Specify	

NOTE: Refer to figure 2-3 and table 4-8 for feedback connection (magnet assembly) information.
1. X = Expert Tuning. Proportional Gain = 4.2; Velocity Gain = 3.0; Minor Loop Feedback Gain = 18.0
2. Travel Sensor Motion in this instance refers to the motion of the magnet assembly.
3. Values shown are for Relay A and C. Reverse for Relay B.

- Performance Tuner

Note

The Performance Tuner is available for instrument level AD, PD, and ODV, and can only be run while in Travel control mode.

The Performance Tuner is used to determine digital valve controller tuning. It can be used with digital valve controllers mounted on most sliding-stem and rotary actuators, including Fisher and other manufacturers' products. Moreover, because the performance tuner can detect internal instabilities before they become apparent in the travel response, it can generally optimize tuning more effectively than manual tuning. Typically, the performance tuner takes 3 to 5 minutes to tune an instrument, although tuning instruments mounted on larger actuators may take longer.

Integral Settings

- Integral DeadZ—A window around the Primary Setpoint in which integral action is disabled. This feature is used to eliminate friction induced limit cycles around the Primary Setpoint when the integrator is active. The Dead Zone is configurable from 0% to 2%, corresponding to a symmetric window from 0% to +/-2% around the Primary Setpoint. Default value is 0.25%.
- Integ Limit—The Integral Limit provides an upper limit to the integrator output. The high limit is configurable from 0 to 100% of the I/P drive signal.

Pressure Tuning

⚠ WARNING

Changes to the tuning set may cause the valve/actuator assembly to stroke. To avoid personal injury and property damage caused by moving parts, keep hands, tools, and other objects away from the valve/actuator assembly.

- Press Tuning Set

Press Tuning Set—There are twelve Pressure Tuning Sets to choose from. Each tuning set provides a preselected value for the digital valve controller gain settings. Tuning set B provides the slowest response and M provides the fastest response.

Tuning set B is appropriate for controlling a pneumatic positioner. Table 4-5 lists the proportional gain, pressure integrator gain and minor loop feedback gain values for preselected tuning sets.

Table 4-5. Gain Values for Preselected Pressure Tuning Sets

Tuning Set	Proportional Gain	Integrator Gain	Minor Loop Feedback Gain
B	0.5	0.3	35
C	2.2	0.1	35
D	2.4	0.1	35
E	2.8	0.1	35
F	3.1	0.1	35
G	3.6	0.1	34
H	4.2	0.1	31
I	4.8	0.1	27
J	5.6	0.1	23
K	6.6	0.1	18
L	7.8	0.1	12
M	9.0	0.1	12
X (Expert)	User Adjusted	User Adjusted	User Adjusted

In addition, you can specify Expert tuning and individually set the pressure proportional gain, pressure integrator gain, and pressure minor loop feedback gain. Individually setting or changing any tuning parameter will automatically change the tuning set to X (expert).

Note

Use Expert tuning only if standard tuning has not achieved the desired results.

Stabilize/Optimize or Performance Tuner may be used to achieve the desired results more rapidly than Expert tuning.

Press Prop Gain—Pressure Proportional Gain is the proportional gain for the pressure control tuning set. Changing this parameter will also change the tuning set to Expert.

Press MLFB Gain—Pressure MLFB Gain is the minor loop feedback gain for the pressure control tuning set. Changing this parameter will also change the tuning set to Expert.

- Press Integ Enab—Yes or No. Enable the pressure integral setting to improve static performance by correcting for error that exists between the pressure target and actual pressure. Pressure Integral Control is disabled by default.
- Press Integ Gain—Pressure Integral Gain (also called reset) is the gain factor applied to the time integral of the error signal between desired and actual pressure. Changing this parameter will also change the tuning set to Expert.

Travel/Pressure Control

Field Communicator	Configure / Setup > Detailed Setup > Response Control > Tvl/Presss Control (1-2-2-2)

- Tvl/Press Select

Travel/Pressure Select determines if the instrument is set up for position or pressure control. Select Travel, Pressure, Travel with Pressure Fallback/Auto recovery or Travel with Pressure Fallback/Manual Recovery. If the travel sensor fails, and Travel with Pressure Fallback/Auto Recovery is selected, it will return to travel control when the travel sensor starts working again. Travel with Pressure Fallback/Manual recovery will stay in pressure control until Travel Pressure Select is changed to Travel or Travel with Pressure Fallback/Auto recovery. It is not necessary to enable the Travel Sensor Alert for Pressure Fallback to occur.

Note

Travel / Pressure Select must be set to Travel for double-acting actuators

Tvl/Press Cutoffs

- *Tvl/Press Cut Hi*

  Travel Cutoff High defines the high cutoff point for the travel in percent (%) of ranged input current. Above this cutoff, the travel target is set to 123.0% of the ranged input current. When a Travel Cutoff High is set, the Travel Limit High is deactivated, since only one of these parameters can be active. Travel Cutoff Hi is deactivated by setting it to 125.0%.

  Pressure Cutoff Hi defines the high cutoff point for the pressure in percent (%) of pre-characterized setpoint. Above this cutoff, the pressure target is set to 123.0%. A Pressure Cutoff Hi of 99.5% is recommended to ensure valve goes fully open. Pressure Cutoff Hi is deactivated by setting it to 125%.

- *Tvl/Press Cut Lo*

  Travel Cutoff Low defines the low cutoff point for the travel set point. Travel Cutoff Low can be used to ensure proper seat load is applied to the valve. When below the travel cutoff low, the output is set to zero or to full supply pressure, depending upon the zero power condition. A Travel Cutoff Low of 0.5% is recommended to help ensure maximum shutoff seat loading. When a Travel Cutoff Low is set, the Travel Limit Low is deactivated, since only one of these parameters can be active. Travel Cutoff Low is deactivated by setting it to -25%.

  Pressure Cutoff Lo defines the low cutoff point for the pressure in percent (%) of pre-characterized setpoint. Below this cutoff, the pressure target is set to -23%. A Pressure Cutoff Lo of 0.5% is recommended to help ensure maximum shutoff seat loading. Pressure Cutoff Lo is deactivated by setting it to -25.0%

Travel Limits

- *Tvl Limit Hi*—Defines the high limit for the travel in percent (%) of ranged travel. It is the maximum allowable travel (in percent of ranged travel) for the valve. During operation, the travel target will not exceed this limit. When a Travel Limit High is set, the Travel Cutoff High is deactivated, since only one of these parameters can be active. Travel Limit High is deactivated by setting it to 125.0%

- *Tvl Limit Lo*—Defines the low limit for the travel in percent (%) of ranged travel. It is the minimum allowable travel (in percent of ranged travel) for the valve. During operation, the travel target will not exceed this limit. When a Travel Limit Low is set, the Travel Cutoff Low is deactivated, since only one of these parameters can be active. Travel Limit Low is deactivated by setting it to -25.0%.

Pressure Control

- *Press Range Hi*—The high end of output pressure range. Enter the pressure that corresponds with 100% valve travel when Zero Power Condition is closed, or 0% valve travel when Zero Power Condition is open. This pressure *must be greater* than the Pressure Range Lo.

- *Press Range Lo*—The low end of the output pressure range. Enter the pressure that corresponds to 0% valve travel when Zero Power Condition is closed, or 100% valve travel when Zero Power Condition is open. This pressure *must be less* than the Pressure Range Hi.

End Pt Press Control (Instrument Level ODV)

Note
End Point Pressure Control is available for instrument level ODV.

- *End Pt Control Enab*— Select Yes or No. End Point Pressure Control allows the digital valve controller to pull back from saturation of the pneumatic output after reaching the travel extreme. Rather than having the instrument provide full supply pressure (saturation) continuously at the travel extreme, the digital valve controller switches to an End Point Pressure Control where the output pressure (pressure controller set point) to the actuator is maintained at a certain value. This value is configured through the Upper Operating Pressure feature. Because the digital valve controller is constantly in control and not allowed to reach a dormant or saturated state, it is constantly testing its own pneumatic system. If there is an output pressure deviation, for example, the instrument will issue an alert. To ensure there is an alert when an output pressure deviation occurs, setup the alert as described under Pressure Deviation Alert.

- *PST Start Pt*—Defines the travel stop the valve needs to be at before a partial stroke test can be initiated. Also defines the travel stop for end point pressure control. Setting this value to Not Configured will disable partial stroke tests and end point pressure control.

- *Press Set Point*—Used in conjunction with End Point Pressure Control, Pressure Set Point allows the user to select a pressure to be delivered by the instrument at the travel extreme. For a fail-closed valve, this pressure must be sufficient to maintain the fully open position. For a fail-open valve, this pressure (which is automatically set to supply pressure) must be sufficient to fully close the valve and maintain its rated shutoff classification. For double-acting spring return actuators, this is the differential pressure required to either maintain the fully open or fully closed position, depending on the valve and actuator configuration. For a double-acting actuator without springs with a fail-close valve, this is 95% of the supply pressure. If the valve is fail-open, the upper operating pressure for all actuator is set to the supply pressure.

- *Press Sat Time*— Pressure Saturation Time is the time the digital valve controller stays in hard cutoff before switching to pressure control. Default is 45 seconds.

Input Characterization

Field Communicator	Configure / Setup > Detailed Setup > Response Control > Input Char (1-2-2-3)

Input Characterization defines the relationship between the travel target and ranged set point. Ranged set point is the input to the characterization function. If the zero power condition equals closed, then a set point of 0% corresponds to a ranged input of 0%. If the zero power condition equals open, a set point of 0% corresponds to a ranged input of 100%. Travel target is the output from the characterization function.

To select an input characterization, select *Select Input Char* from the *Input Characterization* menu. You can select from the three fixed input characteristics shown in figure 4-1 or you can select a custom characteristic. Figure 4-1 shows the relationship between the travel target and ranged set point for the fixed input characteristics, assuming the Zero Power Condition is configured as closed.

You can specify 21 points on a custom characteristic curve. Each point defines a travel target, in % of ranged travel, for a corresponding set point, in % of ranged set point. Set point values range from -6.25% to 106.25%. Before modification, the custom characteristic is linear.

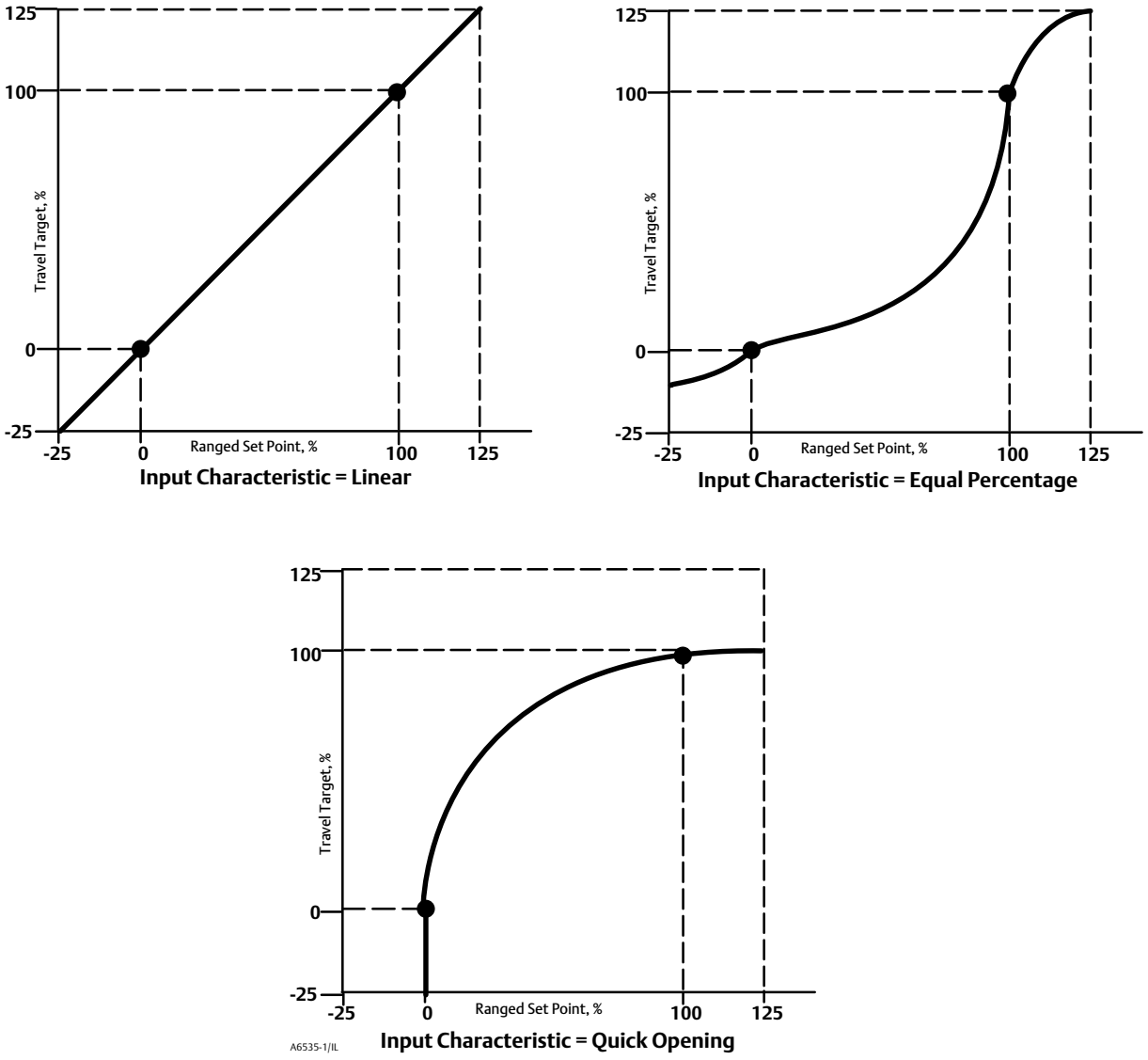
Define Custom Characterization

Field Communicator	Configure / Setup > Detailed Setup > Response Control > Define Cust Char (1-2-2-4)

To define a custom input character, from the *Response Control* menu select *Define Cust Char.* Select the point you wish to define (1 to 21), then enter the desired set point value. Press Enter then enter the desired travel target for the corresponding set point. When finished, select point 0 to return to the *Response Control* menu.

With input characterization you can modify the overall characteristic of the valve and instrument combination. Selecting an equal percentage, quick opening, or custom (other than the default of linear) input characteristic modifies the overall valve and instrument characteristic. However, if you select the linear input characteristic, the overall valve and instrument characteristic is the characteristic of the valve, which is determined by the valve trim (i.e., the plug or cage).

Figure 4-1. Travel Target Versus Ranged Set Point, for Various Input Characteristics (Zero Power Condition = Closed)



Dynamic Response

Field Communicator	Configure / Setup > Detailed Setup > Response Control > Dynamic Response (1-2-2-5)

- SP Rate Open—Maximum rate (% of valve travel per second) at which the digital valve controller will move to the open position regardless of the rate of input current change. A value of 0 will deactivate this feature and allow the valve to stroke open as fast as possible.

- SP Rate Close—Maximum rate (% of valve travel per second) at which the digital valve controller will move to the close position regardless of the rate of input current change. A value of 0 will deactivate this feature and allow the valve to stroke close as fast as possible.

- Lag Time—Slows the response of the digital valve controller. A value ranging from 0.2 to 10.0 can be used for noisy or fast processes to improve closed loop process control. Entering a value of 0.0 will deactivate the lag filter.

Note
Lag Time is available for instrument level HC, AD, and PD.

- Lead/Lag—ODV devices have access to a lead-lag input filter that can be used to improve a valve's dynamic response. The lead-lag input filter is part of the set point processing routine that reshapes the input signal before it becomes travel set point. Lead-lag filters are characterized by lead and lag time constants.

Note
View/Edit Lead/Lag is only available instrument level ODV.

When the valve is in its active control region (off the seat), the lead-lag filter improves small amplitude response by momentarily overdriving the travel set point. This is useful when the actuator is large and equipped with accessories. As a result, any volume boosters that are present will be activated. The longer the lag time, the more pronounced the overdrive. Since the lead-lag input filter is used to enhance the dynamic response of a control valve, filter parameters should be set after the tuning parameters have been established.

When the valve is at its seat, the lead-lag filter also has a boost function that sets the initial conditions of the filter artificially low so that small amplitude signal changes appear to be large signal changes to the filter. The boost function introduces a large spike that momentarily overdrives the instrument and activates any external volume boosters that may be present. The lead-lag boost function is normally disabled except for those cases where the valve must respond to small command signals off the seat. By setting the lead/lag ratio in the opening and closing directions to 1.0, the boost function can be enabled without introducing lead-lag dynamics in the active control region. See table 4-6 for typical lead-lag filter settings.

Table 4-6. Typical Lead/Lag Filter Settings

Parameter	Description	Typical Value
Lag Time	First order time constant. A value of 0.0 will disable the lead-lag filter.	0.2 sec
Opening Lead/Lag Ratio	Initial response to the filter in the opening direction.	2.0
Closing Lead/Lag Ratio	Initial response to the filter in the closing direction.	2.0
Lead-Lag Boost	Initial conditions of the lead-lag filter when the lower travel cutoff is active.	Off

Alert Setup

Field Communicator	Configure / Setup > Detailed Setup > Alerts (1-2-3)

The following menus are available for configuring Alerts. Items on the menus may be changed with the instrument In Service. Protection does not need to be removed (no need to set to *None*). Alerts are not processed when a Diagnostic is in progress. Follow the prompts on the Field Communicator display to configure the following alerts: *Electronics Alerts, Sensor Alerts, Environment Alerts, Travel Alerts, Travel History Alerts, SIS Alerts* (instrument level ODV), and *Alert Record*.

Note
The Alerts section covers alerts and shutdowns. An alert, if enabled, can provide information on operation and performance issues. A shutdown, if enabled, and upon the occurrence of the associated failure alert, will cause the instrument air output to go to the

Zero Power Condition as per figure 4-6. It will remain latched in that condition until power to the instrument is cycled and the failure alert has cleared. While in shutdown condition the instrument will remain powered up and able to communicate via HART. Shutdown alerts are turned off by default.

Electronics Alerts

Field Communicator	Configure / Setup > Detailed Setup > Alert Setup > Electronics Alerts (1-2-3-1)

Drive Current Shutdown

When enabled, the instrument shuts down whenever the drive current does not read as expected.

Drive Signal Alert—Drive Signal Alert checks the drive signal and calibrated travel. If one of the following conditions exists for more than 20 seconds, the Drive Signal Alert is set.

For the case where Zero Power Condition is defined as closed:

Drive Signal < 10% and Calibrated Travel > 3%

Drive Signal > 90% and Calibrated Travel < 97%

For the case where Zero Power Condition is defined as open:

Drive Signal < 10% and Calibrated Travel < 97%

Drive Signal > 90% and Calibrated Travel > 3%

- *Drive Signal Alert Enab*—Yes or No. Drive Signal Alert Enable activates checking of the relationship between the Drive Signal and the calibrated travel. Factory default is Yes.
- *Drive Signal*—Shows the value of the instrument drive signal in % (percent) of maximum drive.

Processor Impaired Alerts

- *Offline/Failed Alert Enab*—If enabled, set when the device is in a failed state and not controlling the input.
- *Low Power Write Fail Enab*—When enabled, an alert is generated if a write to the instrument is attempted and fails when the loop current is less than 3.5 mA.
- *Non-Critical NVM Alrt Enab*—When enabled, an alert is generated whenever there is a failure associated with non-critical NVM (non-volatile memory).
- *Critical NVM Shutdown*—When enabled, the instrument shuts down whenever there is a failure associated with critical NVM (non-volatile memory).
- *Flash ROM Shutdown*—When enabled, the instrument shuts down whenever there is a failure associated with flash ROM (read only memory).
- *No Free Time Shutdown*—When enabled, the instrument shuts down whenever there is a failure associated with No Free Time.
- *Reference Voltage Shutdown*—When enabled, the instrument shuts down whenever there is a failure associated with the internal voltage reference.

Sensor Alerts

Field Communicator	Configure / Setup > Detailed Setup > Alert Setup > Sensor Alerts (1-2-3-2)

Tvl Sensor Shutdown—When enabled, the instrument shuts down whenever there is a failure associated with the travel sensor.

Temp Sensor Shutdown—When enabled, the instrument shuts down whenever there is a failure associated with the temperature sensor.

Press Sensor Shutdown—When enabled, the instrument shuts down whenever there is a failure associated with the pressure sensor.

Environment Alerts

Field Communicator	Configure / Setup > Detailed Setup > Alert Setup > Environment Alerts (1-2-3-3)

Supply Press Lo Alrt

Note
The Supply Pressure Lo alert is available for instrument level AD, PD, and ODV.

- *Supply Press Lo Alrt Enab*—When enabled, the instrument sends an alert when the supply pressure falls below the supply pressure alert point. Factory default is Yes.
- *Supply Press*—Displays the instrument supply pressure in kPa,bar, psi, or kg/cm^2.
- *Supply Press Lo Alrt Pt*—When the supply pressure falls below the supply pressure alert point, the supply pressure alert is active. To disable the supply pressure alert, set Supply Press Alrt Pt to zero.

Aux Terminal Alrt

- *Aux Terminal Alrt Enab*—Yes or No. Auxiliary Input Alert Enable activates checking the status of the auxiliary input when the Auxiliary Terminal Mode is Aux Input Alert. When enabled, the Auxiliary Input Alert is set when the auxiliary input terminals are either open or closed, depending upon the selection for the Aux In Alrt State. Factory default is No.
- *Aux Input*—The auxiliary input is a contact or discrete input, which may be open or closed.
- *Aux Term Mode*—Auxiliary Input Alert or Auto Travel Calibration. Selecting Auxiliary Input Alert then Aux In Alrt Enab activates checking the status of the auxiliary input contacts. Selecting Auto Travel Calib permits starting an automatic travel calibration procedure by placing a jumper across the auxiliary input terminals for 3 to 5 seconds.

Loop Current Validation Enable—When enabled, the instrument shuts down whenever there is a failure associated with the measured loop current being out-of-range.

Note
Loop Current Validation Enable is available for instrument level AD, PD, and ODV.

Travel Alerts

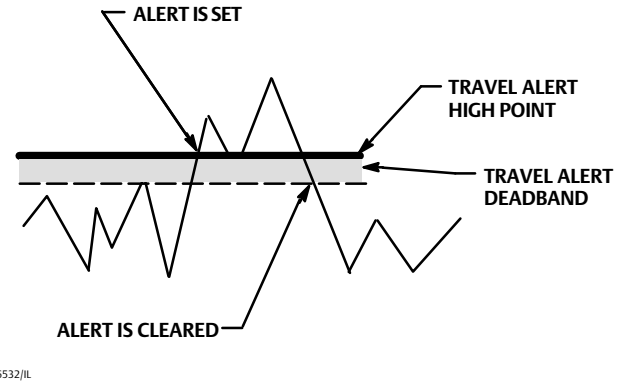
Field Communicator	Configure / Setup > Detailed Setup > Alert Setup > Travel Alerts (1-2-3-4)

Travel—Travel displays the actual position of the valve in percent (%) of calibrated travel.

Tvl Set Pt—Travel set point is the input to the characterization function.

Tvl Alert DB—Travel Alert Deadband is the travel, in percent (%) of ranged travel, required to clear a travel alert, once it has been set. The deadband applies to both Travel Alert Hi/Lo and Travel Alert Hi Hi/Lo Lo. See figure 4-2.

Figure 4-2. Travel Alert Deadband



Travel Deviation Alert—If the difference between the travel target and the actual target exceeds the Travel Deviation Alert Point for more than the Travel Deviation Time, the Travel Deviation Alert is set. It remains set until the difference between the travel target and the actual travel is less than the Travel Deviation Alert Point minus the Travel Alert Deadband.

- *Tvl Dev Alrt Enab*—Select Yes or No. When enabled, the Travel Deviation Alert checks the difference between the travel target and the actual travel. Factory default is Yes.
- *Tvl Dev Alrt Pt*—Travel Deviation Alert Point is the alert point for the difference, expressed in percent (%), between the travel target and the actual travel. When the difference exceeds the alert point for more than the Travel Deviation Time, the Travel Deviation Alert is set.
- *Tvl Dev Time*—Travel Deviation Time is the time, in seconds, that the travel deviation must exceed the Travel Deviation Alert Point before the alert is set.

Travel Limit Alerts—Travel Alert Hi Hi is set if the ranged travel rises above the alert high point. Once the alert is set, the ranged travel must fall below the alert high high point by the Travel Alert Deadband before the alert is cleared. See figure 4-2.

Travel Alert Lo Lo is set if the ranged travel falls below the alert low low point. Once the alert is set, the ranged travel must rise above the alert low low point by the Travel Alert Deadband before the alert is cleared.

- *Tvl Alrt Hi Hi Enab*—Yes or No. Activates checking of the ranged travel against the Travel Alert Hi Hi points. Factory default is No.
- *Tvl Alrt Lo Lo Enab*—Yes or No. Activates checking of the ranged travel against the Travel Alert Lo Lo points. Factory default is No.

- *Tvl Alrt Hi Hi Pt*—The value of the travel, in percent (%) of ranged travel, which, when exceeded, sets the Travel Alert Hi Hi alert.

- *Tvl Alrt Lo Lo Pt*— The value of the travel, in percent (%) of ranged travel, which, when exceeded, sets the Travel Alert Lo Lo alert.

Travel Limit Hi/Lo Alerts—Travel Alert Hi is set if the ranged travel rises above the alert high point. Once the alert is set, the ranged travel must fall below the alert high point by the Travel Alert Deadband before the alert is cleared. See figure 4-2.

Travel Alert Lo is set if the ranged travel falls below the alert low point. Once the alert is set, the ranged travel must rise above the alert low point by the Travel Alert Deadband before the alert is cleared.

- *Tvl Alrt Hi Enab*—Yes or No. Activates checking of the ranged travel against the Travel Alert High Point. Factory default is No.

- *Tvl Alrt Lo Enab*—Yes or No. Activates checking of the ranged travel against the Travel Alert Lo Point. Factory default is No.

- *Tvl Alrt Hi Pt*— The value of the travel, in percent (%) of ranged travel, which, when exceeded, sets the Travel Alert Hi alert.

- *Tvl Alrt Lo Pt*—The value of the travel, in percent (%) of ranged travel, which, when exceeded, sets the Travel Alert Lo alert.

Travel Limit Alerts—Travel Alert Hi Hi is set if the ranged travel rises above the alert high point. Once the alert is set, the ranged travel must fall below the alert high high point by the Travel Alert Deadband before the alert is cleared. See figure 4-2.

Travel Alert Lo Lo is set if the ranged travel falls below the alert low low point. Once the alert is set, the ranged travel must rise above the alert low low point by the Travel Alert Deadband before the alert is cleared.

- *Tvl Alrt Hi Hi Enab*—Yes or No. Travel Alert Hi Hi Enable activates checking of the ranged travel against the Travel Alert High-High points. Factory default is No.

- *Tvl Alrt Lo Lo Enab*—Yes or No. Travel Alert Lo Lo Enable activates checking of the ranged travel against the Travel Alert Low-Low points. Factory default is No.

- *Tvl Alrt Hi Hi Pt*—Travel Alert Hi Hi Point is the value of the travel, in percent (%) of ranged travel, which, when exceeded, sets the Travel Alert Hi Hi alert.

- *Tvl Alrt Lo Lo Pt*—Travel Alert Lo Lo Point is the value of the travel, in percent (%) of ranged travel, which, when exceeded, sets the Travel Alert Lo Lo alert.

Travel Limit Hi/Lo Alerts—Travel Alert Hi is set if the ranged travel rises above the alert high point. Once the alert is set, the ranged travel must fall below the alert high point by the Travel Alert Deadband before the alert is cleared. See figure 4-2.

Travel Alert Lo is set if the ranged travel falls below the alert low point. Once the alert is set, the ranged travel must rise above the alert low point by the Travel Alert Deadband before the alert is cleared.

- Tvl Alrt Hi Enab—Yes or No. Travel Alert Hi Enable activates checking of the ranged travel against the Travel Alert Hi Point. Factory default is No.

- Tvl Alrt Lo Enab—Yes or No. Travel Alert Lo Enable activates checking of the ranged travel against the Travel Alert Lo Point. Factory default is No.

- Tvl Alrt Hi Point—Travel Alert Hi Point is the value of the travel, in percent (%) of ranged travel, which, when exceeded, sets the Travel Alert Hi alert.
- Tvl Alrt Lo Point—Travel Alert Lo Point is the value of the travel, in percent (%) of ranged travel, which, when exceeded, sets the Travel Alert Lo alert.

Travel Limit/Cutoff Alerts

- *Tvl Limit/Cutoff Hi Alrt Enab*—Yes or No. Activates the Travel Limit / Cutoff Hi alert.
- *Tvl Limit/Cutoff Lo Alrt Enab*—Yes or No. Activates the Travel Limit/Cutoff Lo alert.
- *Tvl/Press Cut Hi*

  Travel Cutoff Hi defines the high cutoff point for the travel in percent(%) of pre-characterized set point. Above this cutoff, the travel target is set to 123.0% of the ranged travel. Travel Cutoff Hi is deactivated by setting it to 125.0%.

  Pressure Cutoff Hi defines the high cutoff point for the pressure in percent (%) of pre-characterized set point. Above this cutoff,the pressure target is set to 123.0%. A Pressure Cutoff Hi of 99.5% is recommended to ensure valve goes fully open. Pressure Cutoff Hi is deactivated by setting it to 125%
- *Tvl/Press Cut Lo*

  Travel Cutoff Lo defines the low cutoff point for the travel in percent (%)of pre-characterized set point. Below this cutoff, the travel target is set to -23%. A Travel Cutoff Lo of 0.5% is recommended to help ensure maximum shutoff seat loading. Travel Cutoff Lo is deactivated by setting it to-25.0%

  Pressure Cutoff Lo defines the low cutoff point for the pressure in percent (%) of pre-characterized set point. Below this cutoff,the pressure target is set to -23%. A Pressure Cutoff Lo of 0.5% is recommended to help ensure maximum shutoff seat loading. Pressure Cutoff Lo is deactivated by setting it to -25.0%
- *Tvl Limit High*—Defines the high limit for the travel in percent (%) of ranged travel. It is the maximum allowable travel (in percent of ranged travel) for the valve. During operation, the travel target will not exceed this limit. When a Travel Limit High is set, the Travel Cutoff High is deactivated, since only one of these parameters can be active. Travel Limit High is deactivated by setting it to 125.0%.
- *Tvl Limit Lo*—Defines the low limit for the travel in percent (%) of ranged travel. It is the minimum allowable travel (in percent of ranged travel) for the valve. During operation, the travel target will not exceed this limit. When a Travel Limit Low is set, the Travel Cutoff Low is deactivated, since only one of these parameters can be active. Travel Limit Low is deactivated by setting it to -25.0%.

Travel History Alerts

Field Communicator	Configure / Setup > Detailed Setup > Alerts > Travel History Alerts (1-2-3-5)

Cycle Count

- *Cycle Count Alrt Enab*—Yes or No. Activates checking of the difference between the Cycle Counter and the Cycle Counter Alert point. The Cycle Counter Alert is set when the value exceeds the Cycle Counter Alert point. It is cleared after you reset the Cycle Counter to a value less than the alert point. Factory default is No.
- *Cycle Count*—Records the number of times the travel changes direction. The change in direction must occur after the deadband has been exceeded before it can be counted as a cycle. See figure 4-3. You can reset the Cycle Counter by configuring it as zero.
- *Cycle Count Alrt Pt*—The value of the Cycle Counter, in cycles, which, when exceeded, sets the Cycle Counter Alert.

Cycle Count/Tvl Accum Deadband

- *Deadband*—Cycle Counter Deadband is the area around the travel reference point, in percent (%) of ranged travel, that was established at the last increment of the Cycle Counter. This area must be exceeded before a change in travel direction can be counted as a cycle. See figure 4-3.

  Travel Accumulator Deadband is the area around the travel reference point, in percent (%) of ranged travel, that was established at the last increment of the accumulator. This area must be exceeded before a change in travel can be accumulated. See figure 4-4.

Table 4-3. Cycle Counter Deadband (set at 10%)

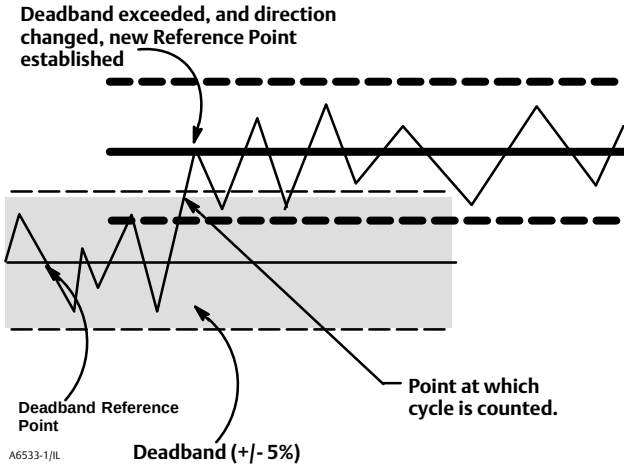
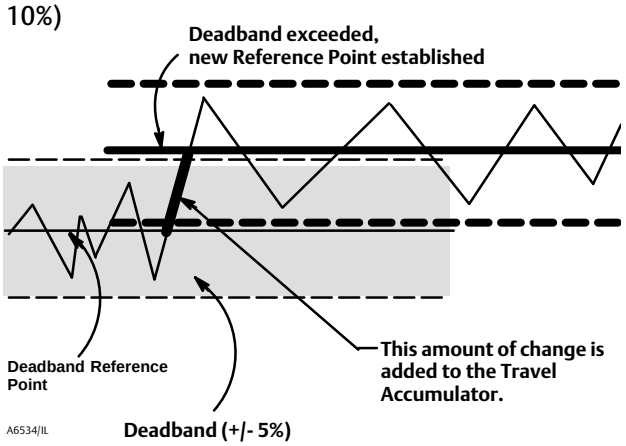

Deadband exceeded, and direction changed, new Reference Point established
Deadband Reference Point
Point at which cycle is counted.
A6533-1/IL
Deadband (+/- 5%)

Figure 4-4. Travel Accumulator Deadband (set at 10%)


Deadband exceeded, new Reference Point established
Deadband Reference Point
This amount of change is added to the Travel Accumulator.
A6534/IL
Deadband (+/- 5%)

Tvl Accum

- *Tvl Accum Alrt Enab*—Yes or No. Activates checking of the difference between the Travel Accumulator value and the Travel Accumulator Alert Point. The Travel Accumulation Alert is set when the Travel Accumulator value exceeds the Travel Accumulator Alert Point. It is cleared after you reset the Travel Accumulation to a value less than the alert point. Factory default is No.
- *Tvl Accum*—Records the total change in travel, in percent (%) of ranged travel, since the accumulator was last cleared. The value of the Travel Accumulator increments when the magnitude of the change exceeds the Travel Accumulator Deadband. See figure 4-4. You can reset the Travel Accumulator by configuring it to zero.
- *Tvl Accum Alrt Pt*—The value of the Travel Accumulator, in percent (%) of ranged travel, which, when exceeded, sets the Travel Accumulator Alert.

SIS Alerts (Instrument Level ODV)

Field Communicator	Configure / Setup > Detailed Setup > Alert Setup > SIS Alerts (1-2-3-6)

Note
SIS Alerts are only available for instrument level ODV.

- *PST Press Limit*—Partial Stroke Test Pressure Limit defines the output pressure that will cause the partial stroke test to stop. For actuators that vent from the test starting point, the pressure limit will be a minimum value. For actuators that fill from the test starting point, the pressure limit will be a maximum value.

- *Press Dev Alrt Enab*—Select Yes or No. This alert notifies a monitoring system when a deviation in the actuator pressure has occurred. This is used when the instrument is controlling via pressure (Pressure Control Mode is enabled) to the actuator (rather than valve position) to prevent saturation of the pneumatic output. When enabled, this alert checks the difference between the target pressure and the actual pressure. If the difference exceeds the Pressure Deviation Alert Point for more than the pressure deviation time, the Pressure Deviation Alert is set. It remains set until the difference between the target pressure and the actual pressure is less than the Pressure Deviation Alert Point. The pressure deviation alert point and deviation alert time are configurable and can be disabled altogether. Factory default is Yes.

- *Press Dev Alrt Point*—The alert point for the difference between the pressure target and the actual pressure. When the difference exceeds the alert point for more than the Pressure Deviation Time, the Pressure Deviation Alert is set. After completion of the Setup Wizard or Auto Travel calibration a default value of 2 psi is set. This will generate an alert when the actuator pressure is not within ± 2 psi of the target pressure.

- *Press Dev Time*—The time, in seconds, that the pressure deviation must exceed the Pressure Deviation Alert Point before the alert is set. The Pressure Deviation Time is set to 30 seconds by default.

Alert Record

Field Communicator	HC, AD and PD Configure / Setup > Detailed Setup > Alert Setup > SIS Alerts (1-2-3-6)
	ODV Configure / Setup > Detailed Setup > Alert Setup > SIS Alerts (1-2-3-7)

To be recorded, an alert must both be enabled for reporting, and the group in which it resides must be enabled for recording. Table 4-7 lists the alerts included in each of the groups. When any alert from an enabled group becomes active, active alerts in all enabled groups are stored.

Table 4-7. Alerts Included in Alert Groups for Alert Record

Alert Group	Alerts Include in Group
Valve Alerts	Travel Lo Alert Travel Hi Alert Travel Lo Lo Alert Travel Hi Hi Alert Travel Deviation Alert Drive Signal Alert
Failure Alerts	Flash ROM Fail No Free Time Reference Voltage Fail Drive Current Fail Critical NVM Fail Temperature Sensor Fail Pressure Sensor Fail Travel Sensor Fail
Miscellaneous Alerts	Auxiliary input

Alert Record Not Empty Enab—Yes or No. When enabled indicates when an alert has been recorded. Factory default is Yes.

Alert Record Full Enab—Yes or No. When enabled indicates when the Alert Record is full. Factory default is Yes.

Display Record—Displays all recorded alerts and the date and time the alerts were recorded.

Clear Records—Clears the alert record. To clear the alert record, all alerts in enabled groups must be inactive.

Alert Groups

- *Failure Group Enable*—Permits enabling the Failure Alert group. Table 4-7 lists the alerts included in each of the groups. Factory default is Yes.
- *Valve Group Enab*—Permits enabling the Valve Alert group. Table 4-7 lists the alerts included in each of the groups. Factory default is Yes.
- *Misc Group Enab*—Permits enabling the Miscellaneous Alert group. Table 4-7 lists the alerts included in each of the groups. Factory default is No.

Status

Field Communicator	Configure / Setup > Detailed Setup > Status (1-2-4)

Follow the prompts on the Field Communicator display to configure the following parameters: *Instrument Time, Calibration and Diagnostics, Operational,* and *Integrator.*

Instrument Time

- *Inst Time Invalid Enab*—Yes or No. When enabled indicates if the Instrument Time Invalid alert is active. Factory default is Yes.
- *Inst Date and Time*—Permits setting the instrument clock. When alerts are stored in the alert record, the record includes the time and date. The instrument clock uses a 24-hour format.

Calibration and Diagnostics

- *Cal in Progress Enab*—Yes or No. When enabled indicates that calibration is in progress. Factory default is No.
- *AutoCal in Progress Enab*—Yes or No. When enabled indicates that auto calibration is in progress. Factory default is No.
- *Diag in Progress Enab*—Yes or No. When enabled indicates that a diagnostic test is in progress. Factory default is No.
- *Diag Data Avail Enab*—Yes or No. When enabled indicates when there is diagnostic data available. Factory default is Yes.

Operational

- *Press Ctrl Active Enab*—Yes or No. When enabled indicates when Pressure Control is active. Factory default is Yes.
- *Multi-Drop Enab*—Yes or No. When enabled indicates the digital valve controller is operating in a multi-drop loop. Factory default is No.

Integrator

- *Integrator Sat Hi Enab*—Yes or No. When enabled indicates when the Integrator Saturated High alert is active. Factory default is Yes.
- *Integrator Sat Lo Enab*—Yes or No. When enabled indicates when the Integrator Saturated Lo alert is active. Factory default is Yes.

- *Integ Limit*—The Integral Limit provides an upper limit to the integrator output. The high limit is configurable from 0 to 100% of the I/P drive signal.

- *Integral DeadZ*—Integral Dead Zone is the window around the Primary Setpoint in which integral action is disabled. This feature is used to eliminate friction induced limit cycles around the Primary Setpoint when the integrator is active. The Dead Zone is configurable from 0% to 2%, corresponding to a symmetric window from 0% to +/-2% around the Primary Setpoint. Default value is 0.25%.

Instrument

Field Communicator	Configure / Setup > Detailed Setup > Instrument (1-2-5)

Follow the prompts on the Field Communicator display to configure the following Instrument parameters: *General, Units, Analog Input Range, Relay Type, Zero Power Condition, Maximum Supply Pressure*, *Auxiliary Terminal Mode*, *Instrument Date and Time*, and *Calibration Status and Type*.

General

- *HART Tag*—Enter an up to 8 character HART tag for the instrument. The HART tag is the easiest way to distinguish between instruments in a multi-instrument environment. Use the HART tag to label instruments electronically according to the requirements of your application. The tag you assign is automatically displayed when the Field Communicator establishes contact with the digital valve controller at power-up.

- *Message*—Enter any message with up to 32 characters. Message provides the most specific user-defined means for identifying individual instruments in multi-instrument environments.

- *Descriptor*—Enter a descriptor for the application with up to 16 characters. The descriptor provides a longer user-defined electronic label to assist with more specific instrument identification than is available with the HART tag.

- *Date*—Enter a date with the format MM/DD/YY. Date is a user-defined variable that provides a place to save the date of the last revision of configuration or calibration information.

- *Valve Serial Num*—Enter the serial number for the valve in the application with up to 12 characters.

- *Inst Serial Num*—Enter the serial number on the instrument nameplate, up to 12 characters.

- *Polling Address*—If the digital valve controller is used in point-to-point operation, the Polling Address is 0. When several devices are connected in the same loop, such as for split ranging, each device must be assigned a unique polling address. The Polling Address is set to a value between 0 and 15. To change the polling address the instrument must be Out Of Service.

  For the Field Communicator to be able to communicate with a device whose polling address is not 0, it must be configured to automatically search for all or specific connected devices.

Units

- *Pressure Units*—Defines the output and supply pressure units in either psi, bar, kPa, or kg/cm^2.

- *Temp Units*—Degrees Fahrenheit or Celsius. The temperature measured is from a sensor mounted on the digital valve controller's printed wiring board.

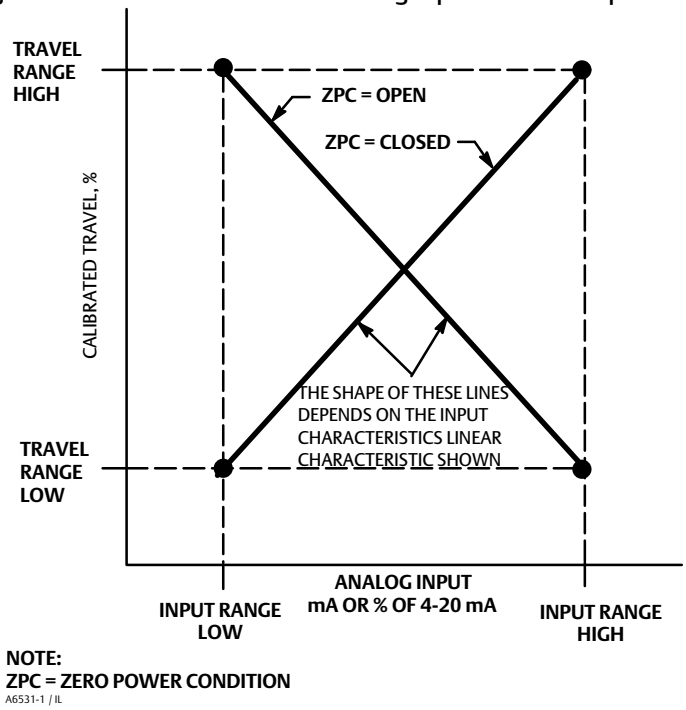
- *Analog In Units*—Permits defining the Analog Input Units in mA or percent of 4-20 mA range.

Analog Input Range

- *Input Range Hi*—Permits setting the Input Range High value. Input Range High should correspond to Travel Range High, if the Zero Power Condition is configured as closed. If the Zero Power Condition is configured as open, Input Range High corresponds to Travel Range Low. See figure 4-5.

- *Input Range Lo*—Permits setting the Input Range Low value. Input Range Low should correspond to Travel Range Low, if the Zero Power Condition is configured as closed. If the Zero Power Condition is configured as open, Input Range Low corresponds to Travel Range High. See figure 4-5.

Figure 4-5. Calibrated Travel to Analog Input Relationship


TRAVEL RANGE HIGH
ZPC = OPEN
ZPC = CLOSED
CALIBRATED TRAVEL, %
THE SHAPE OF THESE LINES DEPENDS ON THE INPUT CHARACTERISTICS LINEAR CHARACTERISTIC SHOWN
TRAVEL RANGE LOW
ANALOG INPUT mA OR % OF 4-20 mA
INPUT RANGE LOW
INPUT RANGE HIGH
NOTE:
ZPC = ZERO POWER CONDITION
A6531-1 / IL

Relay Type—There are three categories of relays that result in combinations from which to select.
Relay Type: The relay type is printed on the label affixed to the relay body.
A = double-acting or single-acting
B = single-acting, reverse
C= single-acting, direct
Special App: This is used in single-acting applications where the "unused" output port is configured to read the pressure downstream of a solenoid valve. See page 31 for additional information.
Lo Bleed: The label affixed to the relay body indicates whether it is a low bleed version.

Zero Pwr Cond—The position of the valve (open or closed) when the electrical power to the instrument is removed. Zero Power Condition (ZPC) is determined by relay type, as shown in figure 4-6.

Figure 4-6. Zero Power Condition

Relay Type	Loss of Electrical Power
Single-Acting Direct (Relay C)	**Port A pressure to zero.**
Double-Acting (Relay A)	**Port A pressure to zero.** **Port B pressure to full supply.**
Single-Acting Reverse (Relay B)	**Port B pressure to full supply.**

Max Supply Press—Enter the maximum supply pressure in psi, bar, kPa, or kg/cm^2, depending on what was selected for pressure units.

Aux Term Mode —Auxiliary Input Alert or Auto Calibration. Selecting *Aux Input Alert* then *Aux In Alrt Enab* activates checking the status of the auxiliary input contacts. Selecting *Auto Travel Calib* permits starting an automatic travel calibration procedure by placing a jumper across the auxiliary input terminals for 3 to 5 seconds.

Inst Date and Time—Permits setting the instrument clock. When alerts are stored in the alert record, the record includes the time and date. The instrument clock uses a 24-hour format.

Calib Status and Loc

- *Last Calib Status*—Indicates the status of the last instrument calibration.
- *Calib Loc*—Indicates the location of the last instrument calibration.

Valve and Actuator

Field Communicator	Configure / Setup > Detailed Setup > Valve & Actuator (1-2-6)

Follow the prompts on the Field Communicator display to configure the following instrument parameters: *Manufacturer, Valve Serial Number*, *Valve Style, Actuator Style*, *Travel Sensor Motion,* and *View / Edit Feedback Connection.*

Manufacturer—Enter the manufacturer of the actuator on which the instrument is mounted. If the actuator manufacturer is not listed, select Other.

Valve Serial Num—Enter the serial number for the valve in the application with up to 12 characters.

Valve Style—Enter the valve style, rotary or sliding-stem

Actuator Style—Enter the actuator style, spring and diaphragm, piston double-acting without spring, piston single-acting with spring, or piston double-acting with spring.

Tvl Sensor Motion—Select Clockwise, or Counterclockwise. Travel Sensor Motion establishes the proper travel sensor rotation. For quarter-turn actuators determine rotation by viewing the rotation of the magnet assembly from the back of the instrument.

Note

Travel Sensor Motion in this instance refers to the motion of the magnet assembly. Note that the magnet assembly may be referred to as a magnetic array in user interface tools.

- For instruments with Relay A and C: If increasing air pressure at output A causes the magnet assembly to move down or the rotary shaft to turn clockwise, enter CW/To Bottom Inst. If it causes the magnet assembly to move up, or the rotary shaft to turn counterclockwise, enter CCW/To Top Inst.
- For instruments with Relay B: If decreasing air pressure at output B causes the magnet assembly to down, or the rotary shaft to turn clockwise, enter CW/To Bottom Inst. If it causes the magnet assembly to move up, or the rotary shaft to turn counterclockwise, enter CCW/To Top Inst.

View / Edit Feedback Connection—Refer to table 4-8 for Feedback Connection options. Choose the assembly that matches the actuator travel range.

Note

As a general rule, do not use less than 60% of the magnet assembly travel range for full travel measurement. Performance will decrease as the assembly is increasingly subranged.

The linear magnet assemblies have a valid travel range indicated by arrows molded into the piece. This means that the hall sensor (on the back of the DVC6200 housing) has to remain within this range throughout the entire valve travel. See figure 2-2. The linear magnet assemblies are symmetrical. Either end may be up.

Table 4-8. Feedback Connection Options

Magnet Assembly	Travel Range		
	mm	Inch	Degrees
SStem #19	8-19	0.32-0.75	-
SStem #25	20-25	0.76-1.00	-
SStem #38	26-38	1.01-1.50	-
SStem #50	39-50	1.51-2.00	-
SStem #100	51-100	2.01-4.00	-
SStem #1 Roller	-	-	60-90°
RShaft Window #1	-	-	60-90°
RShaft Window #2	-	-	60-90°
RShaft End Mount	-	-	60-90°

SIS/Partial Stroke (Instrument Level ODV)

Field Communicator	Configure / Setup > Detailed Setup > SIS/Partial Stroke (1-2-7)

Note

Partial Stroke is only available for instrument level ODV.

Follow the prompts on the Field Communicator display to configure the following partial stroke parameters: *PST Enable*, and *View/Edit PST Variables*.

PST Enable—Yes or No. Enables or disables the Partial Stroke Test.

PST Vars View/Edit—Follow the prompts on the Field Communicator display to enter or view information for following PST Variables: *Max Travel Movement*, *Stroke Speed*, *Pause Time*, *PST Press Limit*, *PST Mode Enable*, *Pressure Set Point*, and *End Pt Control Enable*.

Max Travel Movement—The default value for Max Travel Movement is 10%. It may be set to a value between 1 and 30% in 0.1% increments.

Note

The Max Travel Movement is the percentage of total span that the valve moves away from its operating state towards its fail state during a Partial Stroke Test.

Stroke Speed—The stroke speed can be set for 1%/second, 0.5%/second, 0.25%/second, 0.12%/second, or 0.06%/second. The default value for Partial Stroke Speed is 0.25%/second.

Pause Time—The Setup Wizard sets the Partial Stroke Pause Time to 5 seconds. This is the pause time between the up and down strokes of the test. It can be set for 5, 10, 15, 20 or 30 seconds.

PST Press Limit (single acting actuators)—During the Setup Wizard, or Auto Calibration, the Partial Stroke Pressure Limit value will be set to a positive value. For single acting actuators that vent from the test starting point, the pressure limit will be a minimum value. For those actuators that fill from the test starting point, the pressure limit will be a maximum value. The pressure signal used for this threshold depends on relay type and is summarized below.

Relay Type	Pressure Signal
A or C	Port A - Port B
B	Port B - Port A
B Special App.	Port B
C Special App.	Port A

PST Press Limit (double-acting actuators)— During the Setup Wizard or Auto Calibration, the Partial Stroke Pressure Limit value will be set to a negative value for actuators where the Partial Stroke Start Point is opposite of the Zero Power Condition (e.g., Partial Stroke Start Point= Open and Zero Power Condition = Closed) and to a positive valve for actuators where the Partial Stroke Start Point is the same as the Zero Power Condition.

To set the partial stroke pressure limit manually for single acting actuators select *min pressure.* Select *min diff press* for double acting actuators.

Note

In order to manually set the partial stroke pressure limit with the correct value, you must be able to run a valve signature test using ValveLink software. It is then possible to set the partial stroke pressure limit with the Field Communicator, using the information generated by the valve signature test.

To manually set the partial stroke pressure limit, disable the travel deviation alert by setting Travel Dev Alert Pt to 125%. Also disable “end point pressure control” and disable the partial stroke pressure limit by setting the values shown in table 4-9.

Table 4-9. Values for Disabling Partial Stroke Pressure Limit

Actuator Type	Relay Type	Zero Power Condition	Partial Stroke Start Point	Partial Stroke Pressure Limit (Disabled)
Single Acting	A or C	Closed	Open	0.0
			Closed	Psupply
		Open	Open	Psupply
			Closed	0.0
	B	Closed	Open	Psupply
			Closed	0.0
		Open	Open	0.0
			Closed	Psupply
Double Acting	A	Closed	Open	-Psupply
			Closed	Psupply
		Open	Open	Psupply
			Closed	-Psupply

Run the partial stroke test using the Field Communicator. Once the test is completed download the partial stroke test results using ValveLink software.

Select the Press/Time radio button from the partial stroke valve signature graph. If actuator pressure starts high and moves low, find the minimum actuator pressure, Pmin. Otherwise, find the maximum actuator pressure, Pmax. Use table 4-10 to estimate the partial stroke pressure limit.

The default value is 0.

For double acting valves, the differential pressure is used.

Table 4-10. Estimates for Partial Stroke Pressure Limits

Actuator Style	Relay Type	Zero Power Condition	PST Starting Point	Partial Stroke Pressure Limit(1)
Spring and Diaphragm	A or C	Closed	Open	Pmin - 0.25 * (Bench Set High - Bench Set Low)
			Closed	Pmax + 0.25 * (Bench Set High - Bench Set Low)
		Open	Open	Pmax + 0.25 * (Bench Set High - Bench Set Low)
			Closed	Pmin - 0.25 * (Bench Set High - Bench Set Low)
	B	Closed	Open	Pmax + 0.25 * (Bench Set High - Bench Set Low)
			Closed	Pmin - 0.25 * (Bench Set High - Bench Set Low)
		Open	Open	Pmin - 0.25 * (Bench Set High - Bench Set Low)
			Closed	Pmax + 0.25 * (Bench Set High - Bench Set Low)
Single Acting Piston	A or C	Closed	Open	0.5 * Pmin
			Closed	Pmax + 0.5 * (Psupply - Pmax)
		Open	Open	Pmax + 0.5 * (Psupply - Pmax)
			Closed	0.5 * Pmin
	B	Closed	Open	Pmax + 0.5 * (Psupply - Pmax)
			Closed	0.5 * Pmin
		Open	Open	0.5 * Pmin
			Closed	Pmax + 0.5 * (Psupply - Pmax)
Double Acting Piston	A	Closed	Open	Pmin - 0.5 * (Psupply + Pmin)
			Closed	Pmax + 0.5 * (Psupply - Pmax)
		Open	Open	Pmax + 0.5 * (Psupply - Pmax)
			Closed	Pmin - 0.5 * (Psupply + Pmin)

Section 5 Calibration

Calibration Overview

When a DVC6200 digital valve controller is ordered as part of a control valve assembly, the factory mounts the digital valve controller on the actuator and connects the necessary tubing, then sets up and calibrates the controller.

For digital valve controllers that are ordered separately, recalibration of the analog input or pressure sensors generally is unnecessary. However, after mounting on an actuator, perform the initial setup then calibrate travel by selecting *Calibrate, Travel Calibration,* and *Auto Calibration* from the *Configure* / *Setup* menu. For more detailed calibration information, refer to the following calibration procedures.

Calibrate

Travel Calibration

- Auto Travel Calibration —This procedure automatically calibrates the travel. The calibration procedure uses the valve and actuator stops as the 0% and 100% calibration points.
- Manual Travel Calibration —This procedure permits manual calibration of the travel. This calibration procedure allows you to determine the 0% and 100% calibration points.

Sensor Calibration

- Pressure Sensors—This procedure permits calibrating the three pressure sensors. Normally the sensors are calibrated at the factory and should not need calibration.
- Analog In Calibration—This procedure permits calibrating the analog input sensor. Normally the sensor is calibrated at the factory and should not need calibration.

Relay Adjustment—This procedure permits adjustment of the pneumatic relay.

Restore Factory Settings—This procedure permits you to restore the calibration settings back to the factory settings.

To display the calibrate menu, from the *Online* menu, select *Configure* / *Setup, Calibrate*.

Note

The Instrument Mode must be Out Of Service and the Protection set to None before the instrument can be calibrated.

If you are operating in burst mode, we recommend that you disable burst before continuing with calibration. Once calibration is complete, burst mode may then be turned back on.

⚠ WARNING

During calibration the valve will move full stroke. To avoid personal injury and property damage caused by the release of pressure or process fluid, isolate the valve from the process and equalize pressure on both sides of the valve or bleed off the process fluid.

Travel Calibration

Field Communicator	Configure / Setup > Calibrate > Travel Calibration (1-3-1)

If a double-acting relay is used, you will be prompted to run the relay adjustment when auto or manual calibration is selected. Select Yes to adjust the relay, select No to proceed with calibration. For additional information, refer to Relay Adjustment in this section.

Note

Relay Adjustment is only available for the double-acting relay (Relay A).

Auto Travel Calibration

Field Communicator	Configure / Setup > Calibrate > Travel Calibration > Auto Tvl Calib (1-3-1-1)

1. The auto calibration procedure is automatic. It is completed when the *Calibrate* menu appears.

During calibration, the instrument seeks the high and low end points and the minor loop feedback (MLFB) and output bias. By searching for the end points, the instrument establishes the limits of physical travel, i.e. the actual travel 0 and 100% positions. This also determines how far the relay beam swings to calibrate the sensitivity of the beam position sensor.

2. Place the instrument In Service and verify that the travel properly tracks the current source.

If the unit does not calibrate, refer to table 5-1 for error messages and possible remedies.

Table 5-1. Auto Calibrate Travel Error Messages

Error Message	Possible Problem and Remedy
Power failure occurred during Auto Calib	The analog input signal to the instrument must be greater than 3.8 mA. Adjust the current output from the control system or the current source to provide at least 4.0 mA.
Auto Calib did not complete within the time limit.	The problem may be one or the other of the following: 1. The tuning set selected is too low and the valve does not reach an end point in the allotted time. Press the Hot Key, select *Stabilize/Optimize* then *Increase Response* (selects next higher tuning set). 2. The tuning set selected is too high, valve operation is unstable and does not stay at an end point for the allotted time. Press the Hot Key, select *Stabilize/Optimize* then *Decrease Response* (selects next lower tuning set).
Insufficient travel	Prior to receiving this message, did the instrument output go from zero to full supply? If not, verify instrument supply pressure by referring to the specifications in the appropriate actuator instruction manual. If supply pressure is correct, check instrument pneumatic components (I/P converter and relay). If the instrument output did go from zero to full supply prior to receiving this message, then verify proper mounting by referring to the appropriate mounting procedure in the Installation section.
Drive signal exceed low limit; check supply pressure	1. Check supply pressure (reverse-acting relay) 2. Friction is too high.
Drive signal exceed high limit; check supply pressure	1. Check supply pressure (direct-acting relay) 2. Friction is too high

Manual Travel Calibration

Field Communicator	Configure / Setup > Calibrate > Travel Calibration > Man Tvl Calib (1-3-1-2)

Two procedures are available to manually calibrate travel:

- Analog Adjust
- Digital Adjust

Analog Calibration Adjust

From the *Calibrate* menu, select *Travel Calibration*, *Man Tvl Calib,* and *Analog Adjust.*

Connect a variable current source to the instrument LOOP + and LOOP - terminals. The current source should be capable of generating 4 to 20 mA.

Follow the prompts on the Field Communicator display to calibrate the instrument's travel in percent.

Note

0% Travel = Valve Closed
100% Travel = Valve Open

1. Adjust the input current until the valve is near mid-travel. Press OK.

Note

In steps 4 through 7 the accuracy of the current source adjustment affects the position accuracy.

2. Adjust the current source until the valve is at 0% travel, then press OK.
3. Adjust the current source until the valve is at 100% travel, then press OK.
4. Adjust the current source until the valve is at 0% travel, then press OK.
5. Adjust the current source until the valve is at 100% travel, then press OK.
6. Adjust the current source until the valve is at 5% travel, then press OK.
7. Adjust the current source until the valve is at 95% travel, then press OK.
8. Place the instrument In Service and verify that the travel properly tracks the current source.

Digital Calibration Adjust

From the *Calibrate* menu, select *Travel Calibration*, *Man Tvl Calib* and *Digital Adjust.*

Connect a variable current source to the instrument LOOP + and LOOP - terminals. The current source should be set between 4 and 20 mA.

Follow the prompts on the Field Communicator display to calibrate the instrument's travel in percent.

1. Adjust the input current until the valve is near mid-travel. Press OK.

Note

0% Travel = Valve Closed
100% Travel = Valve Open

2. From the adjustment menu, select the direction and size of change required to set the travel at 0%.

Selecting large, medium, and small adjustments causes changes of approximately 10.0%, 1.0%, and 0.1%, respectively.

If another adjustment is required, repeat step 2. Otherwise, select Done and go to step 3.

3. From the adjustment menu, select the direction and size of change required to set the travel to 100%.

If another adjustment is required, repeat step 3. Otherwise, select Done and go to step 4.

4. From the adjustment menu, select the direction and size of change required to set the travel at 0%.

If another adjustment is required, repeat step 4. Otherwise, select Done and go to step 5.

5. From the adjustment menu, select the direction and size of change required to set the travel to 100%.

If another adjustment is required, repeat step 5. Otherwise, select Done and go to step 6.

6. From the adjustment menu, select the direction and size of change required to set the travel to 5%.

If another adjustment is required, repeat step 6. Otherwise, select Done and go to step 7.

7. From the adjustment menu, select the direction and size of change required to set the travel to 95%.

If another adjustment is required, repeat step 7. Otherwise, select Done and go to step 8.

8. Place the instrument In Service and verify that the travel properly tracks the current source.

Calibration using the Aux Terminal Connections

Note

Pressure range is not captured during this procedure.

Travel calibration can also be accomplished by shorting the auxiliary terminal connections for 3 to 5 seconds. You can abort the procedure by shorting the auxiliary terminals for 1 second.

To enable this calibration *Aux Terminal Mode* must be set to *Auto Calibration*. The instrument *Operational Status* during calibration is *Calibration in Progress*.

Use this calibration procedure to calibrate the digital valve controller travel whenever the I/P converter or relay is replaced. Do not use this calibration for initial calibration when mounting the instrument on an actuator, or if the printed wiring board assembly was replaced.

You can use the auxiliary terminal connections to calibrate the digital valve controller if you suspect calibration has changed due to drift. However, prior to initiating calibration for this reason, perform a Valve Signature diagnostic test, using ValveLink software. This will capture the as-found data for future root cause analysis.

Sensor Calibration

Field Communicator	Configure / Setup > Calibrate > Sensor Calibration (1-3-2)

Note

The pressure sensor is calibrated at the factory and should not require calibration.

Pressure Sensors

Field Communicator	Configure / Setup > Calibrate > Sensor Calibration > Press Sensors (1-3-2-1)

Output Pressure Sensor

To calibrate the output pressure sensor, connect an external reference gauge to the output being calibrated. The gauge should be capable of measuring maximum instrument supply pressure. Depending upon the sensor you wish to calibrate, select either *Output A Sensor* or *Output B Sensor.* Follow the prompts on the Field Communicator display to calibrate the instrument's output pressure sensor.

1. Adjust the supply pressure regulator to the maximum instrument supply pressure. Press OK.
2. The instrument reduces the output pressure to 0. The following message appears.

> Use the Increase and Decrease selections until the displayed pressure matches the output x pressure.

Press OK when you have read the message.

3. The value of the output pressure appears on the display. Press OK to display the adjustment menu.
4. From the adjustment menu, select the direction and size of adjustment to the displayed value.

Selecting large, medium, and small adjustments causes changes of approximately 3.0 psi/0.207 bar/20.7 kPa, 0.30 psi/0.0207 bar/2.07 kPa, and 0.03 psi/0.00207 bar/0.207 kPa, respectively.

If the displayed value does not match the output pressure, press OK, then repeat this step (step 4) to further adjust the displayed value. When the displayed value matches the output pressure, select Done and go to step 5.

5. The instrument sets the output pressure to full supply. The following message appears.

> Use the Increase and Decrease selections until the displayed pressure matches the output x pressure.

Press OK when you have read the message.

6. The value of the output pressure appears on the display. Press OK to display the adjustment menu.
7. From the adjustment menu, select the direction and size of adjustment to the displayed value. If the displayed value does not match the output pressure, press OK, then repeat this step (step 7) to further adjust the displayed value. When the displayed value matches the output pressure, select Done and go to step 8.
8. Place the instrument In Service and verify that the displayed pressure matches the measured output pressure.

Supply Pressure Sensor

Note

Supply Pressure Sensor Calibration is not available for instrument level HC.

To calibrate the supply pressure sensor, connect an external reference gauge to the output side of the supply regulator. The gauge should be capable of measuring maximum instrument supply pressure. From the *Calibrate* menu, select *Sensor Calibration, Press Sensors*, and *Supply Sensor.* Follow the prompts on the Field Communicator display to calibrate the instrument's supply pressure sensor.

1. Select a) Zero Only, or b) Zero and Span (gauge required).

   a. If Zero Only calibration is selected, adjust the supply pressure regulator to remove supply pressure from the instrument. Press OK. Once calibration is complete, go to step 5.

   b. If Zero and Span calibration is selected, adjust the supply pressure regulator to remove supply pressure from the instrument. Press OK. Adjust the supply regulator to the maximum instrument supply pressure. Press OK. Proceed with step 2.

2. The following message appears:

   > Use the Increase and Decrease selections until the displayed pressure matches the instrument supply pressure.

Press OK when you have read this message.

3. The value of the pressure appears on the display.
4. From the adjustment menu, select the direction and size of adjustment to the displayed value.

Selecting large, medium, and small adjustments causes changes of approximately 3.0 psi/0.207 bar/20.7 kPa, 0.30 psi/0.0207 bar/2.07 kPa, and 0.03 psi/0.00207 bar/0.207 kPa, respectively.

Adjust the displayed value until it matches the supply pressure, select Done and go to step 5.

5. Place the instrument In Service and verify that the displayed pressure matches the measured supply pressure.

Analog Input Calibration

Field Communicator	Configure / Setup > Calibrate > Sensor Calibration > Analog In Calib (1-3-2-2)

To calibrate the analog input sensor, connect a variable current source to the instrument LOOP+ and LOOP- terminals. The current source should be capable of generating an output of 4 to 20 mA. Follow the prompts on the Field Communicator display to calibrate the analog input sensor.

1. Set the current source to the target value shown on the display. The target value is the Input Range Low value. Press OK.
2. The following message appears:

> Use Increase and Decrease selections until the displayed current matches the target.

Press OK when you have read this message.

3. The value of the Analog Input appears on the display. Press OK to display the adjustment menu.
4. From the adjustment menu, select the direction and size of adjustment to the displayed value.

Selecting large, medium, and small adjustments causes changes of approximately 0.4 mA, 0.04 mA, and 0.004 mA, respectively.

If the displayed value does not match the current source, press OK, then repeat this step (step 4) to further adjust the displayed value. When the displayed value matches the current source, select Done and go to step 5.

5. Set the current source to the target value shown on the display. The target value is the Input Range High value. Press OK.
6. The following message appears:

> Use Increase and Decrease selections until the displayed current matches the target.

Press OK when you have read this message.

7. The value of the Analog Input appears on the display. Press OK to display the adjustment menu.
8. From the adjustment menu, select the direction and size of adjustment to the displayed value. If the displayed value does not match the current source, press OK, then repeat this step (step 8) to further adjust the displayed value. When the displayed value matches the current source, select Done and go to step 9.
9. Place the instrument In Service and verify that the analog input displayed matches the current source.

Relay Adjustment

Field Communicator	Configure / Setup > Calibrate > Sensor Calibration > Relay Adjust (1-3-3)

Before beginning travel calibration, check the relay adjustment. Replace the digital valve controller cover when finished.

Note

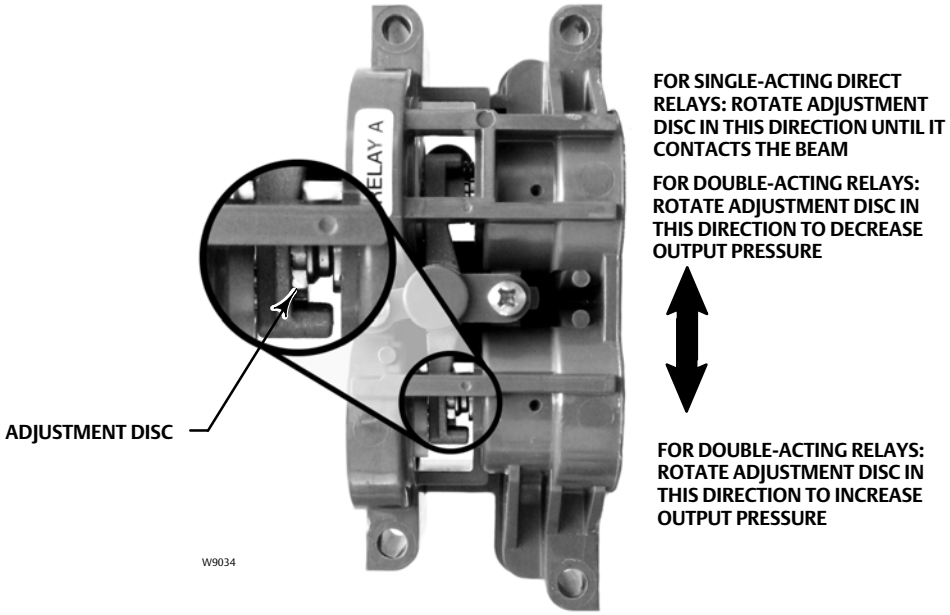
Relay B and C are not user-adjustable.

Double-Acting Relay

The double-acting relay is designated by “Relay A” on a label affixed to the relay itself. For double-acting actuators, the valve must be near mid-travel to properly adjust the relay. The Field Communicator will automatically position the valve when *Relay Adjust* is selected.

Rotate the adjustment disc, shown in figure 5-1, until the output pressure displayed on the Field Communicator is between 50 and 70% of supply pressure. This adjustment is very sensitive. Be sure to allow the pressure reading to stabilize before making another adjustment (stabilization may take up to 30 seconds or more for large actuators).

Figure 5-1. Relay A Adjustment (Shroud Removed for Clarity)


RELAY A
ADJUSTMENT DISC
W9034
FOR SINGLE-ACTING DIRECT RELAYS: ROTATE ADJUSTMENT DISC IN THIS DIRECTION UNTIL IT CONTACTS THE BEAM
FOR DOUBLE-ACTING RELAYS: ROTATE ADJUSTMENT DISC IN THIS DIRECTION TO DECREASE OUTPUT PRESSURE
FOR DOUBLE-ACTING RELAYS: ROTATE ADJUSTMENT DISC IN THIS DIRECTION TO INCREASE OUTPUT PRESSURE

If the low bleed relay option has been ordered stabilization may take approximately two minutes longer than the standard relay.

Relay A may also be adjusted for use in single-acting- direct applications. Rotate the adjustment disc as shown in figure 5-1 for single-acting direct operation.

CAUTION

Care should be taken during relay adjustment as the adjustment disc may disengage if rotated too far.

Single-Acting Relays

⚠ WARNING

For Instrument Level ODV only:

If the unused port is monitoring pressure, ensure that the pressure source conforms to ISA Standard 7.0.01 and does not exceed the pressure supplied to the instrument.

Failure to do so could result in personal injury or property damage caused by loss of process control.

Single-Acting Direct Relay

The single-acting direct relay is designated by "Relay C" on a label affixed to the relay itself. Relay C requires no adjustment.

Single-Acting Reverse Relay

The single-acting reverse relay is designated by "Relay B" on a label affixed to the relay itself. Relay B is calibrated at the factory and requires no further adjustment.

Restoring Factory Settings

Field Communicator	Configure / Setup > Calibrate > Restore Factory Settings (1-3-4)

Note

After restoring factory settings you will need to re-configure and calibrate the instrument.

Follow the prompts on the Field Communicator display to restore calibration and all parameters to the factory settings. You should only restore the calibration if it is not possible to calibrate an individual sensor. Restoring calibration returns the calibration of all of the sensors and the tuning set to their factory settings. Following restoration of the factory calibration, the individual sensors should be recalibrated.

Section 6 Viewing Device Variables and Diagnostics

Device Diagnostics

Note

Device Diagnostics are not available for instrument level AC.

Alert Conditions

Field Communicator	Device Diagnostics > Alert Conditions (2-1)

Instrument Alert Conditions, when enabled, detect many operational and performance issues that may be of interest. To view these alerts navigate to *Alert Conditions*. The alert conditions for each group of alerts are listed below. If there are no alerts active for a particular group the group will not be displayed on the Field Communicator. See table 6-1 for alert groups.

Table 6-1. Alerts Included in Alert Groups for Alert Record

Alert Group	Alerts Include in Group
Valve Alerts	Travel Alert Lo Travel Alert Hi Travel Alert Lo Lo Travel Alert Hi Hi Travel deviation Drive signal
Failure Alerts	Flash ROM fail Drive current fail Ref Voltage fail NVM fail Temperature sensor fail Pressure sensor fail Travel sensor fail
Miscellaneous Alerts	Auxiliary input

- Electronics— If an electronics alert is active it will appear under ELECT ALERTS.

Drive Current

Drive Current Alert—This alert is indicated when the drive current does not read as expected. If this alert occurs, check the connection between the I/P converter and the printed wiring board assembly. Try removing the I/P converter and re-installing it. If the failure does not clear, replace the I/P converter or the printed wiring board assembly.

Drive Signal

Drive Signal Alert—This alert is indicated when the Drive Signal is greater or less than the expected maximum or minimum.

Processor Impaired

Offline/Failed Alert—This alert is indicated if a failure, enabled from the Self Test Shutdown menu, caused an instrument shutdown. Press Enter to see which of the specific failures caused the Offline/Failed indication.

Low Power Write Alert— This alert is activated if a write to the instrument is attempted when the loop current is less than approximately 3.5 mA.

Non-Critical NVM Alert—This alert is indicated if the checksum for data, which are not critical for instrument operation, has failed.

Critical NVM Alert—This alert is indicated when the Non-Volatile Memory integrity test fails. Configuration data is stored in NVM. If this failure is indicated, restart the instrument and see if it clears. If it does not clear, replace the printed wiring board assembly.

Flash ROM Alert—This alert indicates that the Read Only Memory integrity test failed. If this alert is indicated, restart the instrument and see if it clears. If it does not clear, replace the printed wiring board assembly.

Reference Voltage Alert—This failure is indicated whenever there is a failure associated with the internal voltage reference. If this alert is indicated replace the printed wiring board assembly.

Internal Sensor Out of Limits—This alert is indicated if there is a possible problem with either the pressure sensor or the printed wiring board assembly submodule.

Variable Out of Range—This alert is indicated if there is a possible problem with one or more of the following: the Analog Input Signal, the I/P converter submodule, the pneumatic relay submodule, or the printed wiring board.

Field device malfunction—The alert is indicated if the pressure, position, or temperature sensors are providing invalid readings.

- Sensor— If a sensor alert is active it will appear under *SENSOR ALERTS*.

Travel Sensor

Travel Sensor Alert—This alert is indicated if the sensed travel is outside the range of -25.0 to 125.0% of calibrated travel. If this alert is indicated, check the instrument mounting. Also, check that the electrical connection from the travel sensor is properly plugged into the printed wiring board assembly. After restarting the instrument, if the alert does not clear, troubleshoot the printed wiring board assembly or travel sensor.

Pressure Sensors

Pressure Sensor Alert—This alert is indicated if the actuator pressure is outside the range of -24.0 to 125.0% of the calibrated pressure for more than 60 seconds. If this alert is indicated, check the instrument supply pressure. If the failure persists, ensure the printed wiring board assembly is properly mounted onto the Module Base Assembly, and the pressure sensor O-rings are properly installed. If the alert does not clear after restarting the instrument, replace the printed wiring board assembly.

Note

The pressure sensor alert is used for output A, output B, and the supply pressure sensor. Check the pressure values to see which sensor is causing the alert.

Temperature Sensor

Temperature Sensor Alert—This alert is indicated when the instrument temperature sensor fails, or the sensor reading is outside of the range of -40 to 85°C (-40 to 185°F). The temperature reading is used internally for temperature compensation of inputs. If this alert is indicated, restart the instrument and see if it clears. If it does not clear, replace the printed wiring board assembly.

- Environment— If an environment alert is active it will appear under ENVIRO ALERTS.

Supply Pressure

Supply Pressure Lo Alert—This alert is indicated when supply pressure is lower than the configured limit.

Aux Terminal Alert
Aux Terminal Alert—This alert is set when the auxiliary input terminals are either open or closed, depending upon the selection for the Auxiliary Input Alert State.

Loop Current Validation Alert— This alert is activated if the loop current is out of valid range. If the control system is known to output currents outside of this range, the loop current shutdown should not be enabled. If this alert is indicated, clear the alert by restarting the instrument with the loop current verified to be in the valid range. If the alert does not clear, replace the printed wiring board.

- Travel— If a travel alert is active it will appear under TRAVEL ALERTS.

Travel Deviation
Travel Deviation Alert—The difference between Setpoint and Travel is greater than the configured limits.

Travel Limit
Travel Alert Hi Hi—This alert is indicated if the Travel is greater than the configured limit.

Travel Alert Lo Lo—This alert is indicated if the Travel is lower than the configured limit.

Travel Limit Hi/Lo
Travel Alert Hi—This alert is indicated if the Travel is greater than the configured limit.

Travel Alert Lo—This alert is indicated if the Travel is lower than the configured limit.

Travel Limit / Cutoff
Travel Limit/Cutoff Hi—This alert is indicated if the Travel is limited high or the high cutoff is in effect.

Travel Limit/Cutoff Lo—This alert is indicated if the Travel is limited low or the low cutoff is in effect.

- Travel History— If a travel history alert is active it will appear under TVL HIST ALERTS.

Cycle Count
Cycle Count Alert—This alert is indicated if the Cycle Counter exceeds the Cycle Count Alert Point.

Travel Accumulator
Travel Accumulator Alert—This alert is indicated if the Travel Accum exceeds the Travel Accumulator Alert Point.

- SIS (ODV only)— If an SIS alert is active it will appear under SIS ALERTS.

Partial Stroke Test (PST)
Valve Stuck or Pressure/Travel Path Obstructed—This alert is indicated if the valve is stuck or the pressure/travel path is obstructed.

End Point Pressure Deviation
Pressure Deviation Alert—The alert is indicated if the difference between the target pressure and the actual pressure exceeds the Pressure Deviation Alert Point for a period of time greater than the Pressure Deviation Time.

Locked in Safety Alert—This alert is indicated if the ODV unit is locked in the safety position.

- Alert Record

Alert Record not Empty—This alert indicates that an alert has been saved to the alert record.

Alrt Record Full—This alert indicates that the alert record is full.

Viewing Instrument Status

Field Communicator	Device Diagnostics > Status (2-2)

Status displays the status of the Operational items listed below. The status of more than one operational item may be indicated.

Instrument Time

Inst Time Invalid

Calibration and Diagnostics

Cal in Progress, Autocal in Progress, Diag in Progress, Diag Data Avail

Operational

Press Ctrl Active, Multi-Drop

Integrator

Integrator Sat Hi, Integrator Sat Lo

Device Record

Field Communicator	Device Diagnostics > Device Record (2-3)

Follow the prompts on the Field Communicator display to view the following Device Record parameters: *Maximum Temperature*, *Minimum Temperature*, *Run Time,* and *Number of Power Ups*.

- *Temp Max*—Shows the maximum temperature the instrument has experienced since installation.
- *Temp Min*—Shows the minimum temperature the instrument has experienced since installation.
- *Run Time*—Indicates in hours or days the total elapsed time the instrument has been powered up.
- *Num of Power Ups*—Indicates how many times the instrument has cycled power.

Stroking the Digital Valve Controller Output

Field Communicator	Device Diagnostics > Stroke Valve (2-4)

Follow the prompts on the Field Communicator display to select from the following:

- *Done*—Select this if you are done. All ramping is stopped when DONE is selected.
- *Ramp Open*—ramps the travel toward open at the rate of 1.0% per second of the ranged travel.
- *Ramp Closed*—ramps the travel toward closed at the rate of 1.0% per second of the ranged travel.
- *Ramp to Target*—ramps the travel to the specified target at the rate of 1.0% per second of the ranged travel.
- *Step to Target*—steps the travel to the specified target.

Partial Stroke Test (ODV only)

Field Communicator	Device Diagnostics > Partial Stroke Test (2-5)

Note

Partial Stroke Test is only available for instrument level ODV.

The Partial Stroke Test allows DVC6200 digital valve controllers with instrument level ODV to perform a Valve Signature type of test while the instrument is in service and operational. In some applications, it is important to be able to exercise and test the valve to verify that it will operate when commanded. This feature allows the user to partially stroke the valve while continually monitoring the input signal. If a demand arises, the test is aborted and the valve moves to its commanded position. The partial stroke valve travel is configurable between 1 and 30% maximum travel, in 0.1% increments. Data from the last partial stroke test is stored in the instrument memory for retrieval by ValveLink software.

The Partial Stroke Test allows you to perform a partial, 10%, stroke test (standard) or a custom stroke test. With the custom stroke test, the stroke may be extended up to 30%. Be sure to check plant guidelines before performing a custom stroke test. The purpose of this test is to ensure that the valve assembly moves upon demand.

A partial stroke test can be initiated when the valve is operating at either 4 or 20 mA (point-to-point mode). In applications where a spurious trip is to be minimized, 4 mA is the normal operating position.

When enabled, a partial stroke test may be initiated by the device (as a scheduled, auto partial stroke test), a remote push button located in the field or at the valve, a Field Communicator, or ValveLink software.

Device (Digital Valve Controller)

The Auto Partial Stroke Test allows the partial stroke test to be scheduled by the DVC6200. The test is scheduled in number of hours between tests. Any power cycle will reset the test clock timer.

Auxiliary Terminal

The auxiliary terminal can be used for different applications. The default configuration is for a partial stroke test initiated by shorting the contacts wired to the auxiliary +/- terminals of the DVC6200. Refer to Auxiliary Terminal Wiring Length Guidelines below.

- Local Push Button

A partial stroke test command may be sent to the digital valve controller using a set of contacts wired to the auxiliary +/- terminals. To perform a test, the contacts must be closed for 3 to 5 seconds and then opened. To abort the test, close the contacts for 1 second. The last set of diagnostic data is stored in the instrument memory for later retrieval via ValveLink software.

- Local DI

When configured by the user interface, the Auxiliary Terminal can be used as a discrete input from a pressure switch, temperature switch etc., to provide an alert.

Auxiliary Terminal Wiring Length Guidelines

The Auxiliary Input Terminals of a DVC6200 with instrument level ODV can be used with a locally-mounted switch for initiating a partial stroke test. Some applications require that the partial stroke test be initiated from a remote location.

The length for wiring connected to the Auxiliary Input Terminals is limited by capacitance. For proper operation of the Auxiliary Input Terminals capacitance should not exceed 18000 pF. As with all control signal wiring, good wiring practices should be observed to minimize adverse effect of electrical noise on the Aux Switch function.

Example Calculation: Capacitance per foot or per meter is required to calculate the length of wire that may be connected to the Aux switch input. The wire should not exceed the capacitance limit of 18000 pF. Typically the wire manufacturer supplies a data sheet which provides all of the electrical properties of the wire. The pertinent parameter is the highest possible capacitance. If shielded wire is used, the appropriate number is the “Conductor to Other Conductor & Shield” value.

Example — 18AWG Unshielded Audio, Control and Instrumentation Cable

Manufacturer's specifications include:

Nom. Capacitance Conductor to Conductor @ 1 KHz: 26 pF/ft
Nom. Conductor DC Resistance @ 20 Deg. C: 5.96 Ohms/1000 ft
Max. Operating Voltage - UL 200 V RMS (PLTC, CMG),150 V RMS (ITC)
Allowable Length with this cable = 18000pF /(26pF/ft) = 692 ft

Example — 18AWG Shielded Audio, Control and Instrumentation Cable

Manufacturer's specifications include:

Nom. Characteristic Impedance: 29 Ohms
Nom. Inductance: .15 µH/ft
Nom. Capacitance Conductor to Conductor @ 1 KHz: 51 pF/ft
Nom. Cap. Cond. to other Cond. & Shield @ 1 KHz 97 pF/ft
Allowable Length with this cable = 18000pF /(97pF/ft) = 185 ft

The AUX switch input passes less than 1 mA through the switch contacts, and uses less than 5V, therefore, neither the resistance nor the voltage rating of the cable are critical. Ensure that switch contact corrosion is prevented. It is generally advisable that the switch have gold-plated or sealed contacts.

Field Communicator

1. Connect the Field Communicator to the LOOP terminals on the digital valve controller.
2. Turn on the Field Communicator.
3. From the *Online* menu, select *Device Diagnostics* > *Partial Stroke Test*.
4. Select either *Standard (10%)* or *Custom*. With the Custom Stroke Test, the stroke may be entered up to 30% with configurable stroking speed and pause time.
5. The currently configured Stroke, Stroking Speed, and Pause Time is displayed. Choose “Yes” to run the test using these values. Choose “No” to modify the values. The default value for Stroke Speed is 0.25%/second.
6. The valve begins to move and the actual travel reported by the digital valve controller is displayed on the Field Communicator.
7. Once the valve has reached the endpoint, check that the valve has reached the desired set point. The valve should return to its original position.

For information on configuring the Partial Stroke Test, see Partial Stroke Variables in the Detailed Setup section.

Device Variables

Field Communicator	Device Variables (3)

The following menus are available to define and/or view information about the instrument.

Note

Device Variables is not available for instrument level AC.

Analog In

Field Communicator	Device Variables > Analog In (3-1)

Analog Input shows the value of the instrument analog input in mA (milliamperes) or % (percent) of ranged input.

Travel Set Point

Field Communicator	Device Variables > Tvl Set Pt (3-2)

Travel Set Point shows the requested valve position in % of ranged travel post characterization.

Travel

Field Communicator	Device Variables > Travel (3-3)

Travel shows the value of the DVC6200 digital valve controller travel in % (percent) of ranged travel. Travel always represents how far the valve is open.

Drive Signal

Field Communicator	Device Variables > Drive Signal (3-4)

Drive Signal shows the value of the instrument drive signal in % (percent) of maximum drive.

Pressures

Field Communicator	Device Variable > Pressures (3-5)

Shows the value of the instrument supply and output pressures in psi, bar, kPa, or kg/cm^2. Also shows the output pressure differential. To display pressures may require selecting the variable; a detail display of that variable with its values will appear.

- *Pressure A*— Shows the value of Output Pressure A in psi, bar, kPa, or kg/cm^2.
- *Pressure B*— Shows the value of Output Pressure B in psi, bar, kPa, or kg/cm^2.
- *A Minus B*—Shows the value of the output pressure differential in psi, bar, kPa, or kg/cm^2.
- *Supply* —Displays the instrument supply pressure in psi ,bar, kPa, or kg/cm^2. Not available in instrument level HC.

Variables

Field Communicator	Device Variables > Variables (3-6)

The *Variables* menu is available to view additional variables, including; *Auxiliary Input*, *Temperature, Maximum Temperature*, *Minimum Temperature*, *Cycle Counter, Travel Accumulator*, *Raw Travel Input*, *Run Time,* and *Number of Power Ups*.

If a value for a variable does not appear on the display, select the variable and a detailed display of that variable with its value will appear. A variable's value does not appear on the menu if the value becomes too large to fit in the allocated space on the display, or if the variable requires special processing, such as Aux Input.

- *Auxiliary Input*—A discrete input that can be used with an independent limit or pressure switch. Its value is either open or closed.
- *Temperature*—The internal temperature of the instrument is displayed in either degrees Fahrenheit or Celsius.
- *Temp Max*—Shows the maximum temperature the instrument has experienced since installation.
- *Temp Min*—Shows the minimum temperature the instrument has experienced since installation.
- *Cycle Count*—Displays the number of times the valve travel has cycled. Only changes in direction of the travel after the travel has exceeded the deadband are counted as a cycle. Once a new cycle has occurred, a new deadband around the last travel is set. The value of the Cycle Counter can be reset from the *Cycle Count Alert* menu. See page 65 for additional information.
- *Tvl Accum*—Contains the total change in travel, in percent of ranged travel. The accumulator only increments when travel exceeds the deadband. Then the greatest amount of change in one direction from the original reference point (after the deadband has been exceeded) will be added to the Travel Accumulator. The value of the Travel Accumulator can be reset from the *Travel Accumulator* menu. See page 66 for additional information.

Note

The following should only be used for a relative indication to be sure the travel sensor is working and that it is detecting movement of the magnet assembly.

- *Raw Tvl Input*—Indicates the magnet assembly position in analog-to-digital converter counts. When the travel sensor is operating correctly, this number changes as the valve strokes.
- *Run Time*—Indicates in hours or days the total elapsed time the instrument has been powered up.
- *Num of Power Ups*—Indicates how many times the instrument has cycled power.

Device Information

Field Communicator	Device Variables > Device Information (3-7)

The *Device Information* menu is available to view information about the instrument, including; *HART Tag, Device ID*, *Manufacturer*, *Model, Device Revision, Firmware Revision, Hardware Revision, Instrument Level*, and *HART Universal Revision*.

- *Hart Tag*—A HART tag is a unique name (up to eight characters) that identifies the physical instrument.

- *Device ID*—Each instrument has a unique Device Identifier. The device ID provides additional security to prevent this instrument from accepting commands meant for other instruments.
- *Manufacturer*—Identifies the manufacturer of the instrument.
- *Model*—Identifies the instrument model.
- *Device Rev*—Device Revision is the revision number of the software for communication between the Field Communicator and the instrument.
- *Firmware Rev*—The revision number of the firmware in the instrument.
- *Hardware Rev*—The revision number of the electrical circuitry within the instrument printed wiring board.
- *Inst Level*—Indicates the instrument level
  AC—Auto Calibrate
  HC—HART Communicating
  AD—Advanced Diagnostics
  PD—Performance Diagnostics
  ODV—Optimized Digital Valve

Table 6-2 lists the functions available for each instrument level.

Table 6-2. Functions Available for Instrument Level

Instrument Level	Functions Available
AC	Communicates with the Field Communicator. Provides Basic Setup and calibration.
HC	Communicates with the Field Communicator and ValveLink software. In addition, HC provides: travel cutoffs and limits, minimum opening and closing times, input characterization (linear, equal percentage, quick opening, and custom), trending with ValveLink Solo, and the following alerts: travel deviation; travel alert high, low, high high, and low low; drive signal; auxiliary terminal; cycle counter; and travel accumulation.
AD	Includes all functions listed above plus (with ValveLink software) all offline diagnostic tests (dynamic error band, drive signal, step response, and valve signature) plus online trending
PD	Includes all functions listed above plus all Performance Diagnostics online/in-service valve testing (valve friction, electronics, and mechanical condition)
ODV	Includes all functions listed above plus partial stroke test and lead/lag input filter.

- *HART Univ Rev*—The revision number of the HART Universal Commands which are used as the communications protocol for the instrument.
- DD Information

Field Communicator	Device Variables > DD Information (3-8)

DD Information contains the device description in the Field Communicator.

Section 7 Maintenance and Troubleshooting

The DVC6200 digital valve controller enclosure is rated NEMA 4X and IP66, therefore periodic cleaning of internal components is not required. If the DVC6200 is installed in an area where the exterior surfaces tend to get heavily coated or layered with industrial or atmospheric contaminants, however, it is recommended that the vent (key 52) be periodically inspected to ensure it is fully open. If the vent appears to be clogged, it can be removed, cleaned and replaced. Lightly brush the exterior of the vent to remove contaminants and run a mild water/detergent solution through the vent to ensure it is fully open. Allow the vent to dry before reinstalling.

⚠ WARNING

Personal injury or property damage can occur from cover failure due to overpressure. Ensure that the housing vent opening is open and free of debris to prevent pressure buildup under the cover.

⚠ WARNING

To avoid static discharge from the plastic cover, do not rub or clean the cover with solvents. To do so could result in an explosion. Clean with a mild detergent and water only.

⚠ WARNING

Avoid personal injury or property damage from sudden release of process pressure or bursting of parts. Before performing any maintenance procedures on the DVC6200 digital valve controller:

- **Always wear protective clothing, gloves, and eyewear.**
- **Do not remove the actuator from the valve while the valve is still pressurized.**
- **Disconnect any operating lines providing air pressure, electric power, or a control signal to the actuator. Be sure the actuator cannot suddenly open or close the valve.**
- **Use bypass valves or completely shut off the process to isolate the valve from process pressure. Relieve process pressure from both sides of the valve.**
- **Vent the pneumatic actuator loading pressure and relieve any actuator spring precompression.**
- **Use lock-out procedures to be sure that the above measures stay in effect while you work on the equipment.**
- **Check with your process or safety engineer for any additional measures that must be taken to protect against process media.**

⚠ WARNING

When using natural gas as the supply medium, or for explosion proof applications, the following warnings also apply:

- **Remove electrical power before removing the housing cap. Personal injury or property damage from fire or explosion may result if power is not disconnected before removing the cap.**
- **Remove electrical power before disconnecting any of the pneumatic connections.**
- **When disconnecting any of the pneumatic connections or any pressure retaining part, natural gas will seep from the unit and any connected equipment into the surrounding atmosphere. Personal injury or property damage may result from fire or explosion if natural gas is used as the supply medium and appropriate preventive measures are not taken.**

Preventive measures may include, but are not limited to, one or more of the following: ensuring adequate ventilation and the removal of any ignition sources.

- **Ensure that the cover is correctly installed before putting this unit back into service. Failure to do so could result in personal injury or property damage from fire or explosion.**

CAUTION

When replacing components, use only components specified by the factory. Always use proper component replacement techniques, as presented in this manual. Improper techniques or component selection may invalidate the approvals and the product specifications, as indicated in table 1-2. It may also impair operations and the intended function of the device.

Because of the diagnostic capability of the DVC6200, predictive maintenance is available through the use of ValveLink software. Using the digital valve controller, valve and instrument maintenance can be enhanced, thus avoiding unnecessary maintenance. For information on using ValveLink software, refer to the ValveLink software online help.

Replacing the Magnetic Feedback Assembly

To remove the magnet assembly from the actuator stem, perform the following basic steps.

1. Make sure that the valve is isolated from the process.
2. Remove the instrument terminal box cover.
3. Disconnect the field wiring from the terminal board.
4. Shut off the instrument air supply.
5. Disconnect the pneumatic tubing and remove the DVC6200 or the DVC6215 from the actuator.
6. Remove the screws holding the magnet assembly to the connector arm.

When replacing the instrument, be sure to follow the mounting guidelines in the Installation section. Setup and calibrate the instrument prior to returning to service.

Module Base Maintenance

The digital valve controller contains a module base consisting of the I/P converter, printed wiring board assembly, and pneumatic relay. The module base may be easily replaced in the field without disconnecting field wiring or tubing.

Tools Required

Table 7-1 lists the tools required for maintaining the DVC6200 digital valve controller.

Table 7-1. Tools Required

Tool	Size	Component
Phillips Screwdriver		Relay, printed wiring board assembly, and cover screws
Hex key	5 mm	Terminal box screw
Hex key	1.5 mm	Terminal box cover screw
Hex key	2.5 mm	I/P converter screws
Hex key	6 mm	Module base screws

Component Replacement

When replacing any of the components of the DVC6200, the maintenance should be performed in an instrument shop whenever possible. Make sure that the electrical wiring and pneumatic tubing is disconnected prior to disassembling the instrument.

Removing the Module Base

Refer to figure 8-2 or 8-4 for key number locations.

⚠ WARNING

To avoid personal injury or equipment damage from bursting of parts, turn off the supply pressure to the digital valve controller and bleed off any excess supply pressure before attempting to remove the module base assembly from the housing.

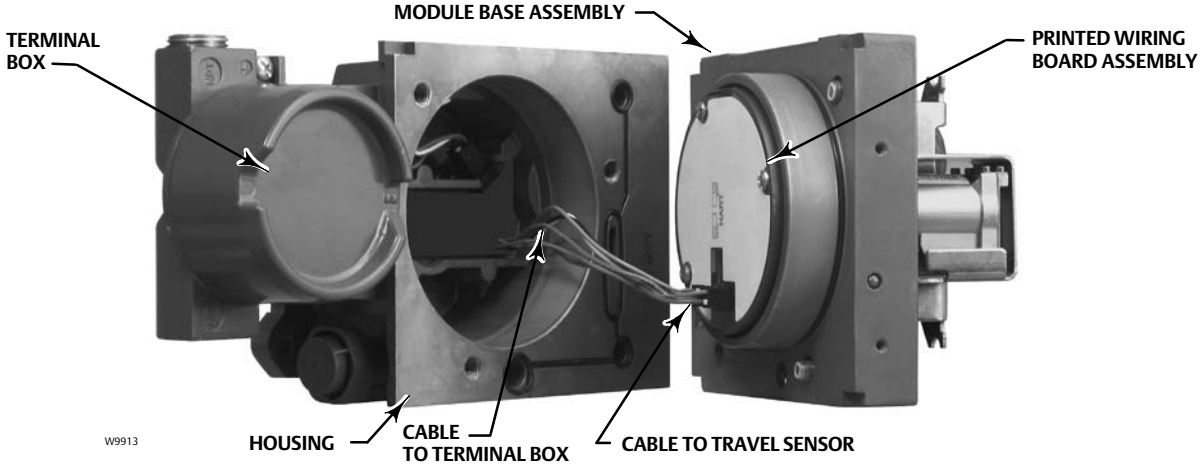
1. Unscrew the four captive screws in the cover (key 43) and remove the cover from the module base (key 2).
2. Using a 6 mm hex socket wrench, loosen the three-socket head screws (key 38). These screws are captive in the module base by retaining rings (key 154).

Note

The module base is linked to the housing by two cable assemblies. Disconnect these cable assemblies after you pull the module base out of the housing.

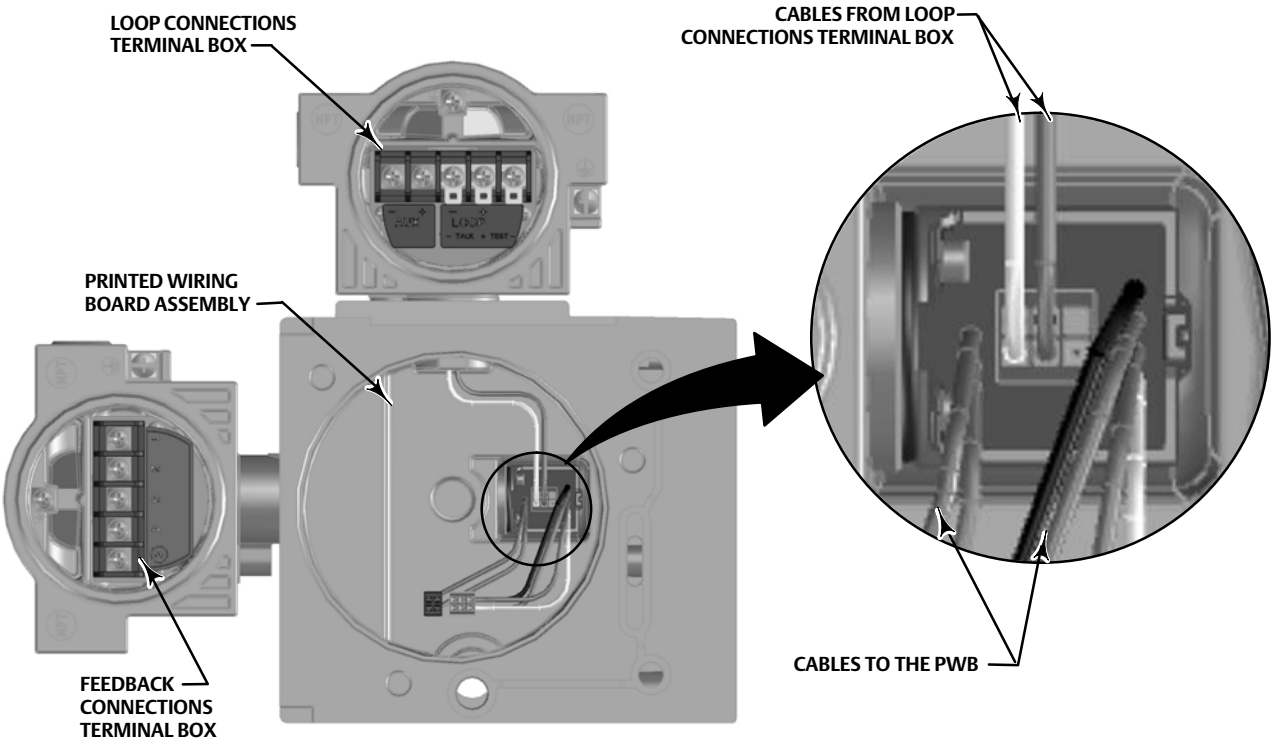
3. Pull the module base straight out of the housing (key 1). Once clear of the housing, swing the module base to the side of the housing to gain access to the cable assemblies.
4. The digital valve controller/base unit has two cable assemblies, shown in figure 7-1, which connect the module base, via the printed wiring board assembly, to the output of the travel feedback sensor board and the travel feedback sensor. Disconnect these cable assemblies from the printed wiring board assembly on the back of the module base.

Figure 7-1. Printed Wiring Board Cable Connections



5. For the DVC6205 only, disconnect the cable assembly from the LOOP connections terminal box, as shown in figure 7-2.

Figure 7-2. FIELDVUE DVC6205 Cable Connections


LOOP CONNECTIONS TERMINAL BOX
CABLES FROM LOOP CONNECTIONS TERMINAL BOX
PRINTED WIRING BOARD ASSEMBLY
FEEDBACK CONNECTIONS TERMINAL BOX
CABLES TO THE PWB

CAUTION

To avoid affecting performance of the instrument, take care not to damage the module base seal or guide surface. Do not bump or damage the bare connector pins on the PWB assembly. Damaging either the module base or guide surface may result in material damage, which could compromise the instruments ability to maintain a pressure seal.

Replacing the Module Base

Refer to figure 8-2 or 8-4 for key number locations.

Note

To avoid affecting performance of the instrument, inspect the guide surface on the module and the corresponding seating area in the housing before installing the module base assembly. These surfaces must be free of dust, dirt, scratches, and contamination.

Ensure the module base seal is in good condition. Do not reuse a damaged or worn seal.

1. Ensure the module base seal (key 237) is properly installed in the housing (key 1). Ensure the O-ring (key 12) is in place on the module base assembly.
2. Connect the two cable assemblies from the sensor board to the PWB assembly (key 50). Orientation of the connector is required.
3. For DVC6205 only, connect the cable assembly from the LOOP connections terminal box to the Feedback Connections Terminal Box (see figure 7-2).
4. Insert the module base (key 2) into the housing (key 1).
5. Install three socket head screws (key 38) in the module base into the housing. If not already installed, press three retaining rings (key 154) into the module base. Evenly tighten the screws in a crisscross pattern to a final torque of 16 N•m (138 lbf•in).

⚠ WARNING

Personal injury, property damage, or disruption of process control can result if the cable assemblies/wiring are damaged when attaching the cover to the module base assembly

Ensure that the cable assemblies/wiring are positioned in the cavity of the module base so they do not get compressed or damaged when attaching the cover to the module base assembly in step 6.

6. Attach the cover (key 43) to the module base assembly.

Submodule Maintenance

The module base of the DVC6200 contains the following submodules: I/P converter, PWB assembly, and pneumatic relay. If problems occur, these submodules may be removed from the module base and replaced with new submodules. After replacing a submodule, the module base may be put back into service.

CAUTION

Exercise care when performing maintenance on the module base. Reinstall the cover to protect the I/P converter and gauges when servicing other submodules.

In order to maintain accuracy specifications, do not strike or drop the I/P converter during submodule maintenance.

I/P Converter

Refer to figure 8-2 or 8-4 for key number locations. The I/P converter (key 41) is located on the front of the module base.

Note

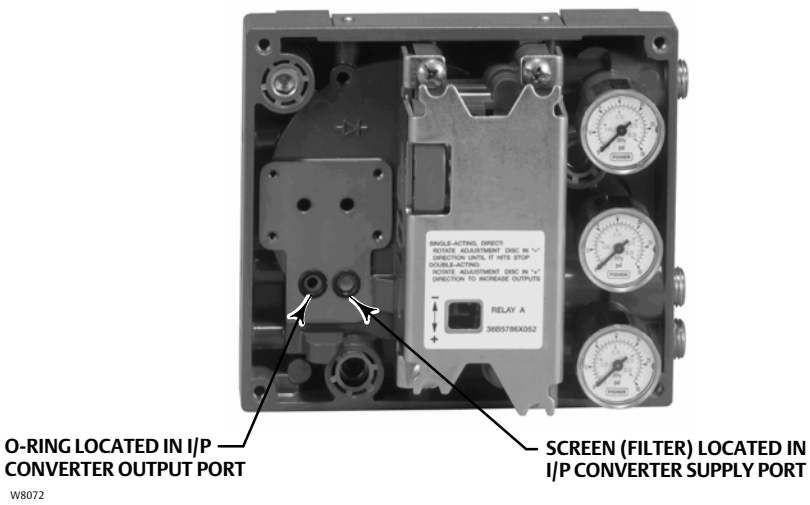
After I/P converter submodule replacement, calibrate the digital valve controller to maintain accuracy specifications.

Replacing the I/P Filter

A screen in the supply port beneath the I/P converter serves as a secondary filter for the supply medium. To replace this filter, perform the following procedure:

1. Remove the I/P converter (key 41) and shroud (key 169) as described in the Removing the I/P Converter procedure.
2. Remove the screen (key 231) from the supply port.
3. Install a new screen in the supply port as shown in figure 7-3.

Figure 7-3. I/P Filter Location



4. Inspect the O-ring (key 39) in the I/P output port. if necessary, replace it.
5. Reinstall the I/P converter (key 41) and shroud (key 169) as described in the Replacing the I/P Converter procedure.

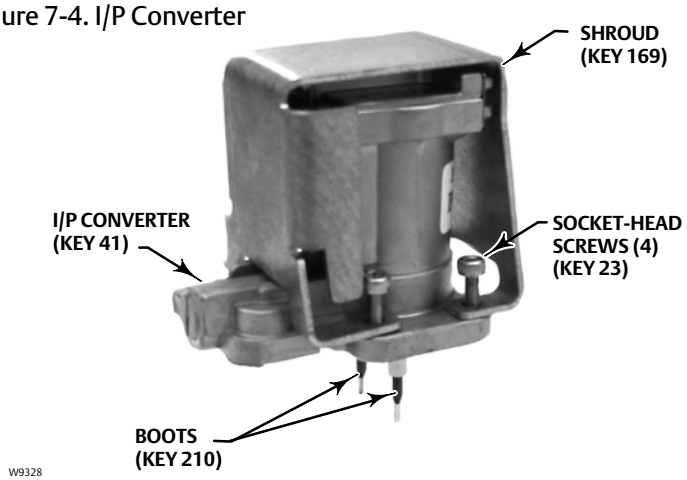
Removing the I/P Converter

1. Remove the front cover (key 43), if not already removed.
2. Refer to figure 7-4. Using a 2.5 mm hex socket wrench, remove the four socket-head screws (key 23) that attach the shroud (key 169) and I/P converter (key 41) to the module base (key 2).
3. Remove the shroud (key 169); then pull the I/P converter (key 41) straight out of the module base (key 2). Be careful not to damage the two electrical leads that come out of the base of the I/P converter.
4. Ensure that the O-ring (key 39) and screen (key 231) stay in the module base and do not come out with the I/P converter (key 41).

Replacing the I/P Converter

1. Refer to figure 7-3. Inspect the condition of the O-ring (key 39) and screen (key 231) in the module base (key 2). Replace them, if necessary. Apply silicone lubricant to the O-rings.
2. Ensure the two boots (key 210) shown in figure 7-4 are properly installed on the electrical leads.

Figure 7-4. I/P Converter



3. Install the I/P converter (key 41) straight into the module base (key 2), taking care that the two electrical leads feed into the guides in the module base. These guides route the leads to the printed wiring board assembly submodule.
4. Install the shroud (key 169) over the I/P converter (key 41).
5. Install the four socket-head screws (key 23) and evenly tighten them in a crisscross pattern to a final torque of 1.6 N•m (14 lbf•in).
6. After replacing the I/P converter, calibrate travel or perform touch-up calibration to maintain accuracy specifications.

Printed Wiring Board (PWB) Assembly

Refer to figure 8-2 or 8-4 for key number locations. The PWB assembly (key 50) is located on the back of the module base assembly (key 2).

Note
The PWB assembly must be firmware revision 9 or later.

Note
If the PWB assembly submodule is replaced, calibrate and configure the digital valve controller to maintain accuracy specifications.

Removing the Printed Wiring Board Assembly

1. Separate the module base from the housing by performing the Removing the Module Base procedure.
2. Remove three screws (key 33).
3. Lift the PWB assembly (key 50) straight out of the module base (key 2).
4. Ensure that the O-rings (key 40) remain in the pressure sensor bosses on the module base assembly (key 2) after the PWB assembly (key 50) has been removed.

Replacing the Printed Wiring Board Assembly and Setting the DIP Switch

1. Apply silicone lubricant to the pressure sensor O-rings (key 40) and install them on the pressure sensor bosses in the module base assembly.

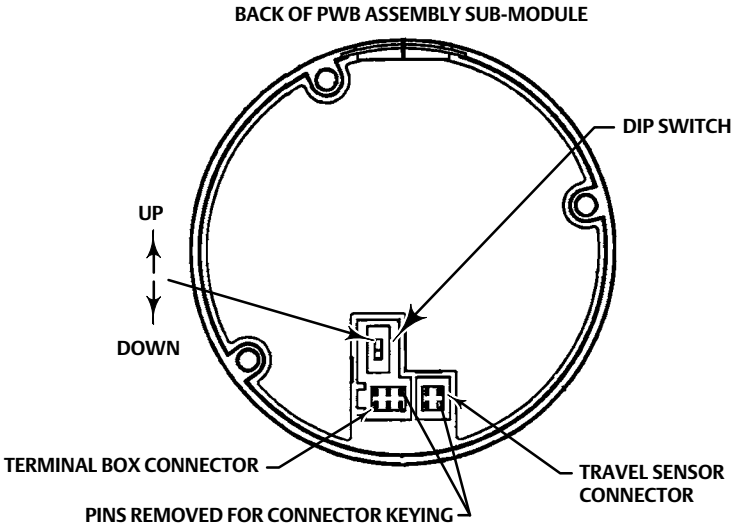
2. Properly orient the PWB assembly (key 50) as you install it into the module base. The two electrical leads from the I/P converter (key 41) must guide into their receptacles in the PWB assembly and the pressure sensor bosses on the module base must fit into their receptacles in the PWB assembly.
3. Push the PWB assembly (key 50) into its cavity in the module base.
4. Install and tighten three screws (key 33) to a torque of 1 N•m (10.1 lbf•in).
5. Set the DIP switch on the PWB assembly according to table 7-2.

Table 7-2. DIP Switch Configuration(1)

Operational Mode	Switch Position
Multidrop Loop	UP
Point-to-Point Loop	DOWN

1. Refer to figure 7-5 for switch location.

Figure 7-5. DIP Switch Location



Note

For the digital valve controller to operate with a 4 to 20 mA control signal, be sure the DIP switch is in the point-to-point loop position, i.e., switch in down position.

6. Reassemble the module base to the housing by performing the Replacing the Module Base procedure.
7. Setup and calibrate the digital valve controller.

Pneumatic Relay

Refer to figure 8-2 or 8-4 for key number locations. The pneumatic relay (key 24) is located on the front of the module base.

Note

After relay submodule replacement, calibrate the digital valve controller to maintain accuracy specifications.

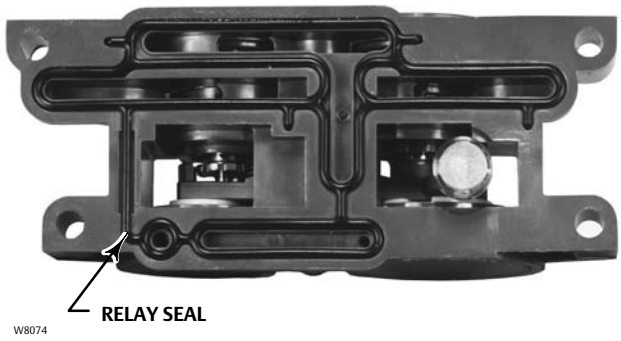
Removing the Pneumatic Relay

1. Loosen the four screws that attach the relay (key 24) to the module base. These screws are captive in the relay.
2. Remove the relay.

Replacing the Pneumatic Relay

1. Visually inspect the holes in the module base to ensure they are clean and free of obstructions. If cleaning is necessary, do not enlarge the holes.
2. Apply silicone lubricant to the relay seal and position it in the grooves on the bottom of the relay as shown in figure 7-6. Press small seal retaining tabs into retaining slots to hold relay seal in place.

Figure 7-6. Pneumatic Relay Assembly



3. Position the relay (with shroud) on the module base. Tighten the four screws, in a crisscross pattern, to a final torque of 2 N•m (20.7 lbf•in).
4. Using the Field Communicator, verify that the value for Relay Type parameter matches the relay type installed.
5. After replacing the relay and verifying the relay type, calibrate travel or perform touch-up calibration to maintain accuracy specifications

Gauges, Pipe Plugs, or Tire Valves

Depending on the options ordered, the DVC6200 or DVC6205 will be equipped with either gauges (key 47), pipe plugs (key 66), or tire valves (key 67). Single-acting direct instruments will also have a screen (key 236, figure 8-3). These are located on the top of the module base next to the relay.

Perform the following procedure to replace the gauges, tire valves, or pipe plugs. Refer to figure 8-2 and 8-3 for key number locations.

1. Remove the front cover (key 43).
2. Remove the gauge, pipe plug, or tire valve as follows:

For gauges (key 47), the flats are on the gauge case. Use a wrench on the flats of the gauge to remove the gauge from the module base. For double-acting instruments, to remove the supply gauge remove one of the output gauges.

For pipe plugs (key 66) and tire valves (key 67), use a wrench to remove these from the module base.

3. Apply zinc based anti-seize sealant (key 64) to the threads of the replacement gauges, pipe plugs, or tire valves.
4. Using a wrench, screw the gauges, pipe plugs, or tire valves into the module base.

Terminal Box

⚠ WARNING

Refer to the Maintenance WARNING at the beginning of this section.

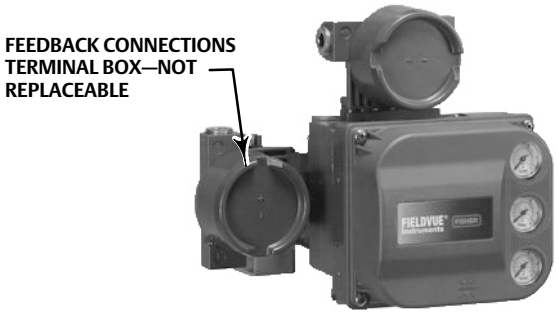
Refer to figure 8-2 or 8-4 for key number locations.

The terminal box is located on the housing and contains the terminal strip assembly for field wiring connections.

Note

The DVC6205 feedback connections terminal box (shown in figure 7-7) is not a replaceable part. Do not remove the tamper proof paint on the screw.

Figure 7-7. FIELDVUE DVC6205 Feedback Connections Terminal Box



Removing the Terminal Box

⚠ WARNING

To avoid personal injury or property damage caused by fire or explosion, remove power to the instrument before removing the terminal box cover in an area which contains a potentially explosive atmosphere or has been classified as hazardous.

1. Loosen the set screw (key 58) in the cap (key 4) so that the cap can be unscrewed from the terminal box.
2. After removing the cap (key 4), note the location of field wiring connections and disconnect the field wiring from the terminal box.
3. Separate the module base from the housing by performing the Removing the Module Base procedure.
4. Disconnect the terminal box wiring connector from the sensor board in the housing assembly (key 50).
5. Remove the screw (key 72). Pull the terminal box assembly straight out of the housing.

Replacing the Terminal Box

Note
Inspect all O-rings for wear and replace as necessary.

1. Apply lubricant, silicone sealant to the O-ring (key 34) and install the O-ring over the stem of the terminal box.
2. Insert the terminal box assembly stem into the housing until it bottoms out. Position the terminal box assembly so that the hole for the screw (key 72) in the terminal box aligns with the threaded hole in the housing. Install the screw (key 72).
3. Connect the terminal box wiring connector to the sensor board in the housing assembly (key 50). Orientation of the connector is required.
4. Reassemble the module base to the housing by performing the Replacing the Module Base procedure.
5. Reconnect the field wiring as noted in step 2 in the Removing the Terminal Box procedure.
6. Apply lubricant, silicone sealant to the O-ring (key 36) and install the O-ring over the 2-5/8 inch threads of the terminal box. Use of a tool is recommended to prevent cutting the O-ring while installing it over the threads.
7. Apply lithium grease (key 63) to the 2-5/8 inch threads on the terminal box to prevent seizing or galling when the cap is installed.
8. Screw the cap (key 4) onto the terminal box.
9. Install a set screw (key 58) into the cap (key 4). Loosen the cap (not more than 1 turn) to align the set screw over one of the recesses in the terminal box. Tighten the set screw (key 58).

DVC6215 Feedback Unit

There are no replaceable parts on the DVC6215 feedback unit. Contact your Emerson Process Management if a replacement DVC6215 feedback unit is needed.

Troubleshooting

If communication or output difficulties are experienced with the instrument, refer to the troubleshooting chart in table 7-3. Also see the DVC6200 Technical Support Checklist on page 109.

Checking Voltage Available

⚠ WARNING

Personal injury or property damage caused by fire or explosion may occur if this test is attempted in an area which contains a potentially explosive atmosphere or has been classified as hazardous.

To check the Voltage Available at the instrument, perform the following:

1. Connect the equipment in figure 2-28 to the field wiring in place of the FIELDVUE instrument.
2. Set the control system to provide maximum output current.
3. Set the resistance of the 1 kilohm potentiometer shown in figure 2-28 to zero.
4. Record the current shown on the milliammeter.
5. Adjust the resistance of the 1 kilohm potentiometer until the voltage read on the voltmeter is 11.0 volts.
6. Record the current shown on the milliammeter.
7. If the current recorded in step 6 is the same as that recorded in step 4 (± 0.08 mA), the voltage available is adequate.
8. If the voltage available is inadequate, refer to Wiring Practices in the Installation section.

Checking the Loop Current Without Disturbing the Loop Wiring

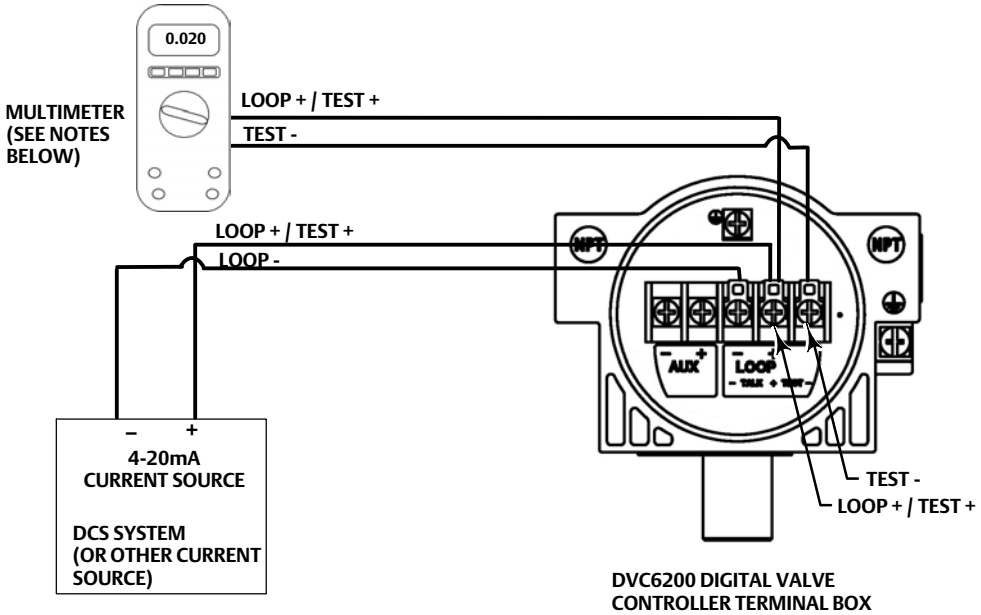
⚠ WARNING

Personal injury or property damage caused by fire or explosion may occur if this test is attempted in an area which contains a potentially explosive atmosphere or has been classified as hazardous.

To check the loop current without disturbing the loop wiring perform the following procedure.

1. With the FIELDVUE instrument connected to a current source connect a digital multimeter reading Volts DC (0 to 1 VDC or mV scale) to the TEST terminals as shown in figure 7-8.
2. The reading at the test terminals is proportional to the loop current [0.004 V = 0.004 A (4 MA)] mA of loop current). Refer to Specifications, table 1-2, to determine if the current is sufficient.

Figure 7-8. Check the Loop Current using the TEST Terminals



NOTES:
1. MULTIMETER MEASURING 0.000 TO 1.0000 VDC
2. TYPICAL READINGS 0.004 VDC TO 0.020 VDC
3. OHM'S LAW—V = I x R, WHERE R = PRECISION 1 OHM RESISTOR, V = I x 1, SO V= I

Table 7-3. Instrument Troubleshooting

Symptom	Possible Cause	Action
1. Analog input reading at instrument does not match actual current provided.	1a. Control mode not Analog.	1a. Check the control mode using the Field Communicator. If in the Digital or Test mode, the instrument receives its set point as a digital signal. Control is not based on input current. Change Control Mode to Analog.
	1b. Low control system compliance voltage.	1b. Check system compliance voltage (see Wiring Practices in the Installation section.
	1c. Instrument shutdown due to self test failure.	1c. Check instrument status using the Field Communicator (see Viewing Instrument Status in the Viewing Device Information section).
	1d. Analog input sensor not calibrated.	1d. Calibrate the analog input sensor (see Analog Input Calibration in the Calibration section).
	1e. Current leakage.	1e. Excessive moisture in the terminal box can cause current leakage. Typically the current will vary randomly if this is the case. Allow the inside of the terminal box to dry, then retest.
2. Instrument will not communicate.	2a. Insufficient Voltage Available.	2a. Calculate Voltage Available (see Wiring Practices in the Installation section). Voltage Available should be greater than or equal to 11 VDC.
	2b. Controller output Impedance too low.	2b. Install a HART filter after reviewing Control System Compliance Voltage requirements (see Wiring Practices in the Installation section).
	2c. Cable capacitance too high.	2c. Review maximum cable capacitance limits (see Wiring Practices in the Installation section).
	2d. HART filter improperly adjusted.	2d. Check filter adjustment (see the appropriate HART filter instruction manual).
	2e. Improper field wiring.	2e. Check polarity of wiring and integrity of connections. Make sure cable shield is grounded only at the control system.
	2f. Controller output providing less than 4 mA to loop.	2f. Check control system minimum output setting, which should not be less than 3.8 mA.
	2g. Disconnected loop wiring cable at PWB.	2g. Verify connectors are plugged in correctly.
	2h. PWB DIP switch not set properly.	2h. Check for incorrect setting or broken DIP switch on the back of the PWB. Reset switch or replace PWB, if switch is broken. See table 7-2 for switch setting information
	2j. PWB failure.	2j. Use a 4-20 mA current source to apply power to the instrument. Terminal voltage across the LOOP+ and LOOP- terminals should be 9 to 10.5 VDC. If the terminal voltage is not 9 to 10.5 VDC, replace the PWB.
	2k. Polling address incorrect.	2k. Use the Field Communicator to set the polling address (refer to the Detailed Setup section). From the *Utility* menu, select *Configure Communicator* > *Polling* > *Always Poll*. Set the instrument polling address to 0.
	2l. Defective terminal box.	2l. Check continuity from each screw terminal to the corresponding PWB connector pin. If necessary, replace the terminal box assembly.
	2m. Defective Field Communicator or ValveLink modem cable.	2m. If necessary, repair or replace cable.
	2n. ValveLink modem defective or not compatible with PC.	2n. Replace ValveLink modem.
	2p. ValveLink hardlock defective or not programmed.	2p. Replace if defective or return to factory for programming.
3. Instrument will not calibrate, has sluggish performance or oscillates.	3a. Configuration errors.	3h. Verify configuration: If necessary, set protection to None. If Out of Service, place In Service. Check: Travel Sensor Motion Tuning set Zero control signal Feedback Connection Control mode (should be Analog) Restart control mode (should be Analog)

Table 7-3. Instrument Troubleshooting (Continued)

Symptom	Possible Cause	Action
	3b. Restricted pneumatic passages in I/P converter.	3j. Check screen in I/P converter supply port of the module base. Replace if necessary. If passages in I/P converter restricted, replace I/P converter.
	3c. O-ring(s) between I/P converter ass'y missing or hard and flattened losing seal.	3k. Replace O-ring(s).
	3d. I/P converter ass'y damaged/corroded/clogged.	3l. Check for bent flapper, open coil (continuity), contamination, staining, or dirty air supply. Coil resistance should be between 1680 - 1860 ohms. Replace I/P assembly if damaged, corroded, clogged, or open coil.
	3e. I/P converter ass'y out of spec.	3m. I/P converter ass'y nozzle may have been adjusted. Verify drive signal (55 to 80% for double-acting; 60 to 85% for single-acting) with the valve off the stops. Replace I/P converter assembly if drive signal is continuously high or low.
	3f. Defective module base seal.	3n. Check module base seal for condition and position. If necessary, replace seal.
	3g. Defective relay.	3p. Depress relay beam at adjustment location in shroud, look for increase in output pressure. Remove relay, inspect relay seal. Replace relay seal or relay if I/P converter assembly is good and air passages not blocked. Check relay adjustment.
	3h. Defective 67CFR regulator, supply pressure gauge jumps around.	3q. Replace 67CFR regulator.
4. ValveLink diagnostic tests provide erroneous results.	4a. Bent or defective pressure sensor.	4a. Replace PWB.
	4b. Pressure sensor O-ring missing.	4b. Replace O-ring.
5. Field Communicator does not turn on.	5a. Battery pack not charged.	5a. Charge battery pack. Note: Battery pack can be charged while attached to the Field communicator or separately. The Field Communicator is fully operable while the battery pack is charging. Do not attempt to charge the battery pack in a hazardous area.

DVC6200 Technical Support Checklist

Have the following information available prior to contacting your Emerson Process Management sales office for support.

1. Instrument serial number as read from nameplate _____
2. Is the digital valve controller responding to the control signal? Yes _____ No _____

   If not, describe _____
3. Measure the voltage across the "Loop -" and Loop +" terminal box screws when the commanded current is 4.0 mA and 20.0 mA: _____V @ 4.0 mA _____V @ 20.0 mA.
   (These values should be around 9.6 V @ 4.0 mA and 10.3 V @ 20 mA).
4. Is it possible to communicate via HART to the digital valve controller? Yes _____ No _____
5. What is the Diagnostic Tier of the digital valve controller? AC ____ HC ____ AD ____ PD ____ ODV____
6. What is the firmware version of the digital valve controller? _____
7. What is the hardware version of the digital valve controller? _____
8. Is the digital valve controller's Instrument Mode "In Service"? Yes _____ No _____
9. Is the digital valve controller's Control Mode set to "Analog"? Yes _____ No _____
10. Is it on Travel or Pressure control?
11. What are the following parameter readings?

    Input Signal _____ Drive Signal _____%

    Supply Pressure _____ Pressure A _____ Pressure B _____

    Travel Target _____% Travel _____%
12. What are the following alert readings?

    Fail alerts _____

    Valve alerts _____

    Operational status _____

    Alert event record entries _____
13. Export ValveLink data (if available) for the device (Status Monitor, Detailed Setup, etc.).

Mounting

1. Which digital valve controller do you have: DVC6200 _____ DVC6205/DVC6215 _____
2. What Make, Brand, Style, Size, etc. actuator is the DVC6200 mounted on? _____
3. What is the full travel of the valve? _____
4. What is the Mounting Kit part number? _____
5. If mounting kits are made by LBP/Customer, please provide pictures of installation.
6. Is the Mounting kit installed per the instructions? Yes _____ No _____
7. What is the safe position of the valve? Fail closed _____ Fail open _____

Section 8 Parts

Parts Ordering

Whenever corresponding with your Emerson Process Management sales office about this equipment, always mention the controller serial number. When ordering replacement parts, refer to the 11-character part number of each required part as found in the following parts list. Part numbers are shown for kits and recommended spares only. For part numbers not shown, contact your Emerson Process Management sales office.

⚠ WARNING

Use only genuine Fisher replacement parts. Components that are not supplied by Emerson Process Management should not, under any circumstances, be used in any Fisher instrument. Use of components not supplied by Emerson Process Management may void your warranty, might adversely affect the performance of the instrument, and could cause personal injury and property damage.

Note

Neither Emerson, Emerson Process Management, nor any of their affiliated entities assumes responsibility for the selection, use, and maintenance of any product. Responsibility for the selection, use, and maintenance of any product remains with the purchaser and end user.

Parts Kits

Kit	Description	Part Number
1*	Elastomer Spare Parts Kit (kit contains parts to service one digital valve controller)	
	Standard	19B5402X012
	Extreme Temperature option (fluorosilicone elastomers)	19B5402X022
2*	Small Hardware Spare Parts Kit (kit contains parts to service one digital valve controller)	19B5403X012
3*	Seal Screen Kit [kit contains 25 seal screens (key 231) and 25 O-rings (key 39)]	
	Standard and Extreme Temperature option (fluorosilicone elastomers)	14B5072X182
4*	Terminal Box Kit, aluminum	
	Standard	19B5401X012
	Standard, Natural Gas approved	19B5401X032
	Extreme Temperature option (fluorosilicone elastomers)	19B5401X022
	Extreme Temperature option (fluorosilicone elastomers) Natural Gas Approved	19B5401X042
5*	I/P Converter Kit	
	Standard	38B6041X152
	For Extreme Temperature option (fluorosilicone elastomers)	38B6041X132
6*	Spare Module Base Assembly Kit, aluminum [kit contains module base (key 2); drive screws, qty. 2, (key 11); shield/label (key 19); hex socket cap screw, qty. 3, (key 38); self tapping screw, qty. 2 (key 49); pipe plug, qty. 3 (key 61); retaining ring, qty. 3 (key 154); screen (key 236); and flame arrestors, qty. 3 (key 243)]	GE18654X012
7*	Spare Housing Assembly Kit, aluminum [kit contains housing (key 1); vent assembly (key 52); seal (only included in Housing A kits) (key 288); seal (key 237); O-ring (key 34); O-ring (only used with integrally mounted regulator) (key 5)]	
	Housing A (used for GX actuator)	
	Standard (nitrile elastomers)	GE48798X012
	Extreme Temperature option (fluorosilicone elastomers)	GE48798X022
	Housing B (used for all actuators except GX)	
	Standard (nitrile elastomers)	GE48798X052
	Extreme Temperature option (fluorosilicone elastomers)	GE48798X062
8*	Spare I/P Shroud Kit [kit contains shroud (key 169) and hex socket cap screw, qty. 4 (key 23)]	GE29183X012

*Recommended spare parts

Kit	Description	Part Number
9*	Remote Mount Feedback Unit Kit (see figure 8-5) [remote housing assembly (key25); hex socket set screw (key 58); 1/2 NPT pipe plug (key 62); wire retainer, qty 2 (key 131); terminal cover (key 255); o-ring (key 256); gasket (Housing A only, used for GX actuator) (key 287); seal (Housing A only, used for GX actuator) (key 288)	
	Housing A (used for GX actuator)	GE46670X012
	Housing B (used for all actuators except GX)	GE40178X012

Parts List

Note
Part numbers are shown for recommended spares only. For part numbers not shown, contact your Emerson Process Management sales office.
Parts with footnote numbers shown are available in parts kits; see footnote information at the bottom of the page.

Key	Description	Part Number

Housing (see figure 8-2 and 8-4)

DVC6200 and DVC6205

1	Housing(7)
11	Drive Screw (2 req'd) (DVC6205 only)
20	Shield (DVC6205 only)
52	Vent, plastic(2)
74	Mounting Bracket (DVC6205 only)
248	Screw, hex head (4 req'd) (DVC6205 only)
249	Screw, hex head (4 req'd) (DVC6205 only)
250	Spacer (4 req'd) (DVC6205 only)
267	Standoff (2 req'd) (DVC6205 only)
271	Screen(7)
287	Gasket, Housing A only (used for GX actuator) (DVC6200 only)
288	Seal, Housing A only (used for GX actuator) (DVC6200 only)

Common Parts (see figure 8-2, 8-3, and 8-4)

DVC6200 and DVC6205

16*	O-ring(1) (3 req'd)
29	Warning label, for use only with LCIE hazardous area classifications
33	Mach Screw, pan head, SST(2) (3 req'd)
38	Cap Screw, hex socket, SST(2)(6) (3 req'd)
43*	Cover Assembly (includes cover screws)
	Standard — 38B9580X022
	Extreme temperature option (fluorosilicone elastomers) — 38B9580X032

Key	Description
48	Nameplate
49	Screw, self tapping (2 req'd)(6)
61	Pipe Plug, hex socket(6) Housing A with relay C (2 req'd) (used for GX actuator) Housing A with relay B (1 req'd) (used for GX actuator) Housing B with relay B and C (1 req'd) (used for all actuators except GX) Not required for relay A
63	Lithium grease (not furnished with the instrument)
64	Zinc based anti-seize compound (not furnished with the instrument)
65	Lubricant, silicone sealant (not furnished with the instrument)
154	Retaining Ring(2) (3 req'd)
236	Screen (required for relay B and C only)(7)
237	Module Base Seal(1)

Module Base (see figure 8-2 and 8-4)

DVC6200 and DVC6205

2	Module Base(6)
11	Drive Screw(6) (2 req'd)
12	O-ring(1)
19	Shield(6)
61	Pipe Plug, hex socket(6) (3 req'd)
243	Slotted Pin (flame arrestor)(6) (3 req'd)

I/P Converter Assembly (see figure 8-2 and 8-4)

DVC6200 and DVC6205

23	Cap Screw, hex socket, SST(2)(8) (4 req'd)
39*	O-ring(1)(3)(5)
41	I/P Converter(5)
169	Shroud(5)(8) (see figure 7-4)
210*	Boot, nitrile(1)(5) (2 req'd) (see figure 7-4)
231*	Seal Screen(1)(3)(5)

*Recommended spare

1. Available in the Elastomer Spare Parts Kit
2. Available in the Small Hardware Spare Parts Kit
3. Available in the Seal Screen Kit
5. Available in the I/P Converter Kit
6. Available in the Spare Module Base Assembly Kit
7. Available in the Spare Housing Assembly Kit
8. Available in the Spare Shroud Kit

Key	Description	Part Number

Relay (see figure 8-2 and 8-4)

DVC6200 and DVC6205

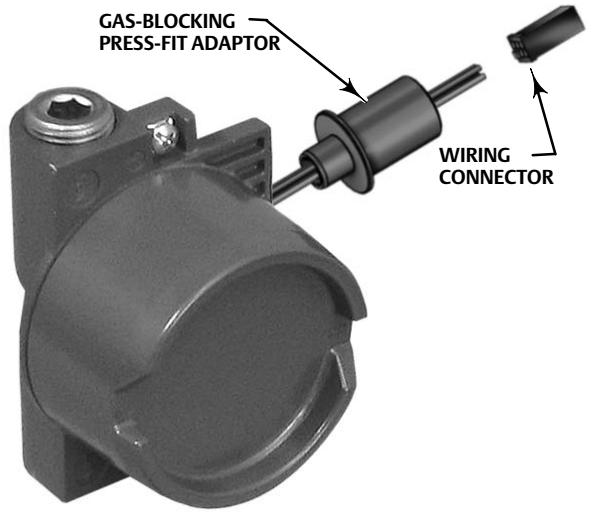
24*	Relay Assembly, (includes shroud, relay seal, mounting screws)	
	Standard (nitrile elastomers)	
	Standard Bleed	
	Housing A (used for GX actuator)	
	Single-/acting direct (relay C)	38B5786X182
	Single-acting reverse (relay B)	38B5786X172
	Housing B (used for all actuators except GX)	
	Single-acting direct (relay C)	38B5786X132
	Double-acting (relay A)	38B5786X052
	Single-acting reverse (relay B)	38B5786X092
	Low Bleed	
	Housing A (used for GX actuator)	
	Single-acting direct (relay C)	38B5786X202
	Single-acting reverse (relay B)	38B5786X192
	Housing B (used for all actuators except G)	
	Single-acting direct (relay C)	38B5786X152
	Double-acting (relay A)	38B5786X072
	Single-acting reverse (relay B)	38B5786X112
	Extreme Temperature option (fluorosilicone elastomers)	
	Standard Bleed	
	Single-acting direct (relay C)	38B5786X142
	Double-acting (relay A)	38B5786X032
	Single-acting reverse (relay B)	38B5786X102
	Low Bleed	
	Single-acting direct (relay C)	38B5786X162
	Double-acting (relay A)	38B5786X082
	Single-acting reverse (relay B)	38B5786X122

Loop Connections Terminal Box (see figure 8-2 and 8-4)

DVC6200 and DVC6205

4	Terminal Box Cap	
34*	O-ring(1)(4)	
36*	O-ring(1)(4)	
58	Set Screw, hex socket, SST(2)	
72	Cap Screw, hex socket, SST(2)	
164	Terminal Box Assembly	

Figure 8-1. Terminal Box of Natural Gas Certified FIELDVUE DVC6200 Digital Valve Controller



Key	Description	Part Number

Feedback Connections Terminal Box (see figure 8-4)

DVC6205

4	Terminal Box Cap	
34*	O-ring(1)(4)	
36*	O-ring(1)(4)	
58	Set Screw, hex socket, SST(2)	
62	Pipe Plug, hex hd, SST	
262	Adapter	
263*	O-ring	
	Standard	1F463606992
	Extreme temperature option, (fluorosilicone)	1F4636X0092

*Recommended spare parts
1. Available in the Elastomer Spare Parts Kit
2. Available in the Small Hardware Spare Parts Kit
4. Available in the Terminal Box Kit

Key Description

PWB Assembly (see figure 8-2 and 8-4)

DVC6200 and DVC6205

Note
Contact your Emerson Process Management sales office for PWB Assembly FS numbers.

50* PWB Assembly
Standard
For instrument level AC
For instrument level HC
For instrument level AD
For instrument level PD
For instrument level ODV

Extreme Temperature option (fluorosilicone elastomers)
For instrument level AC
For instrument level HC
For instrument level AD
For instrument level PD
For instrument level ODV

Key Description Part Number

Pressure Gauges, Pipe Plugs, or Tire Valve Assemblies (see figure 8-3)

DVC6200 and DVC6205

47* Pressure Gauge, nickel-plated brass case, brass connection
Double-acting (3 req'd); Single-acting (2 req'd)
PSI/MPA Gauge Scale
To 60 PSI, 0.4 MPa 18B7713X042
To 160 PSI, 1.1 MPa 18B7713X022
PSI/bar Gauge Scale
To 60 PSI, 4 bar 18B7713X032
To 160 PSI, 11 bar 18B7713X012
PSI/KG/CM^2 Gauge Scale
To 60 PSI, 4 KG/CM^2 18B7713X072
To 160 PSI, 11 KG/CM^2 18B7713X082

66 Pipe Plug, hex head
For double-acting and single-acting direct w/gauges (none req'd)
For single-acting reverse w/gauges (1 req'd)
For all units w/o gauges (3 req'd)

67 Tire Valve, used with Tire Valve Option only
Double-acting (3 req'd); Single-acting (2 req'd)

HART Filters

HF340, DIN rail mount 39B5411X022
HF341, DIN rail Mount, pass through (no filter) 39B5412X012

*Recommended spare parts

Figure 8-2. FIELDVUE DVC6200 Digital Valve Controller Housing Assembly (continued on next page)

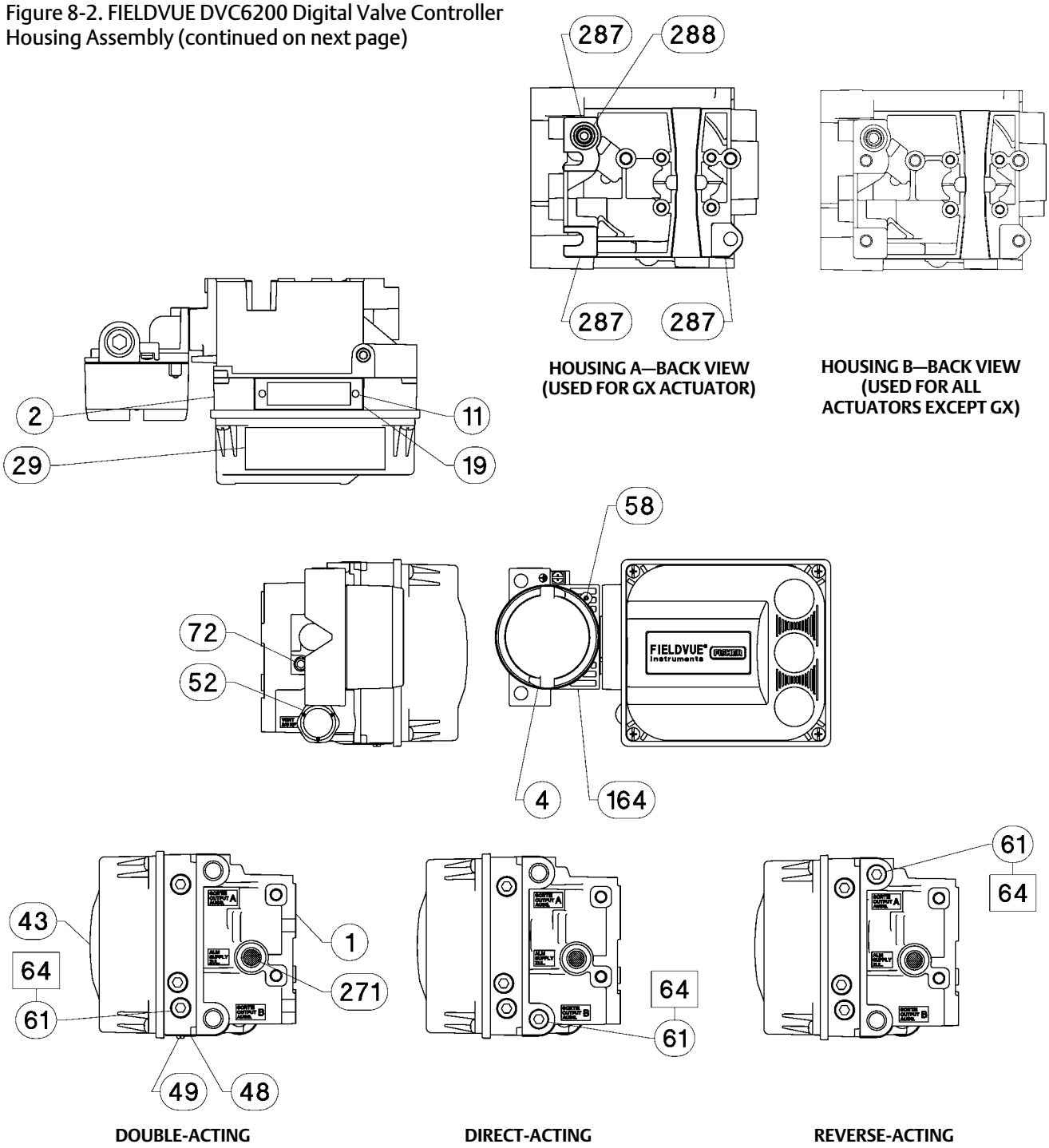


Figure 8-2. FIELDVUE DVC6200 Digital Valve Controller Housing Assembly (continued from previous page)

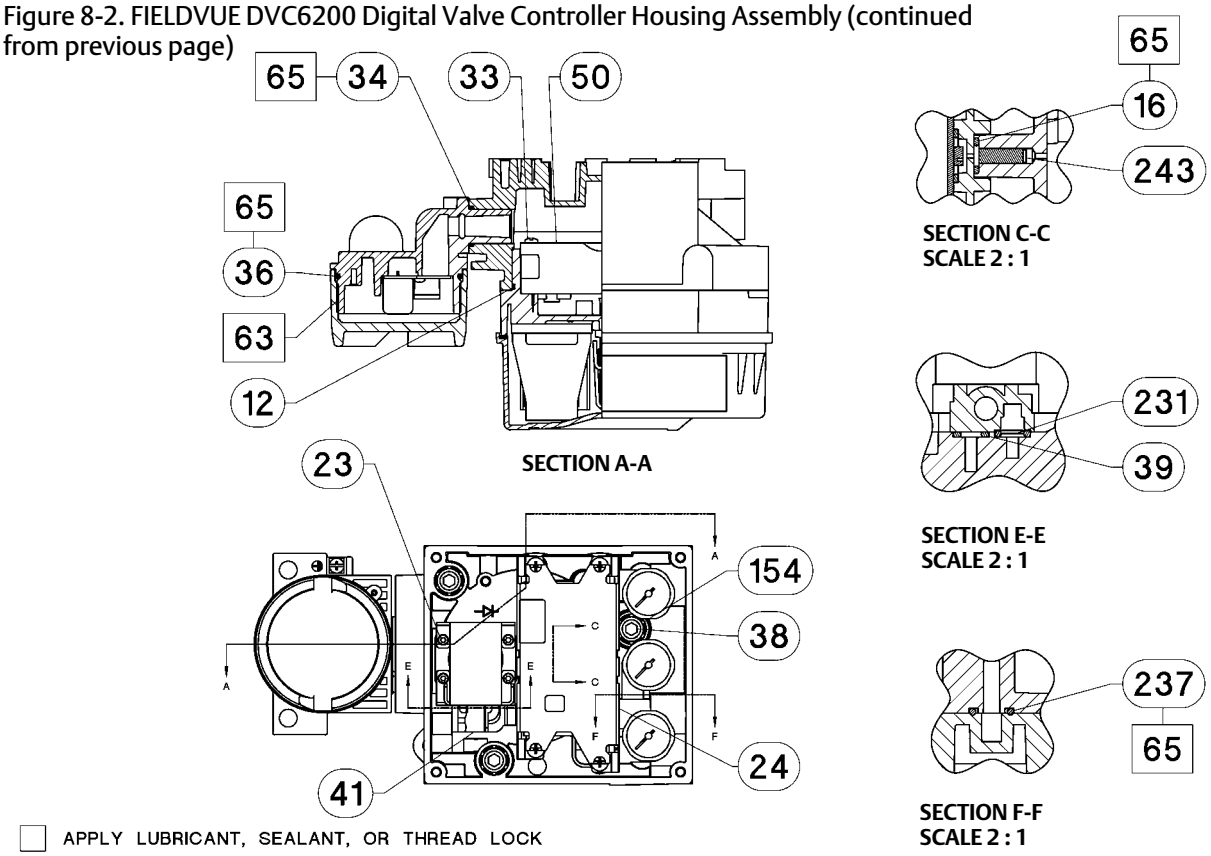


Figure 8-3. Gauge Configuration

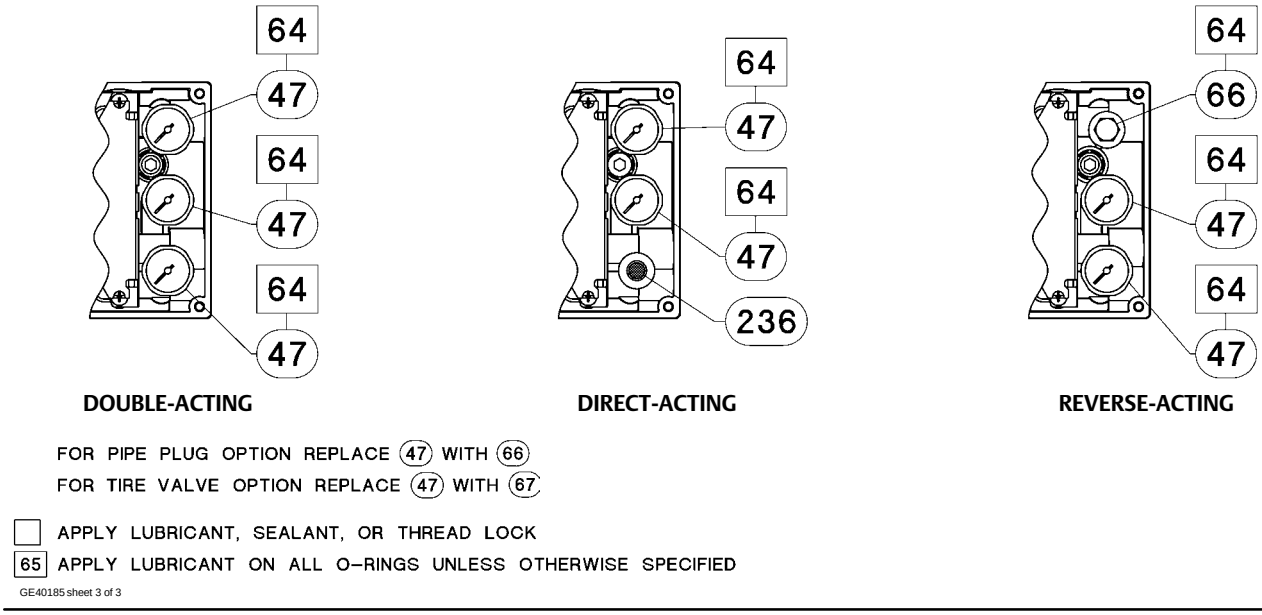


Figure 8-4. FIELDVUE DVC6205 Base Unit Housing Assembly

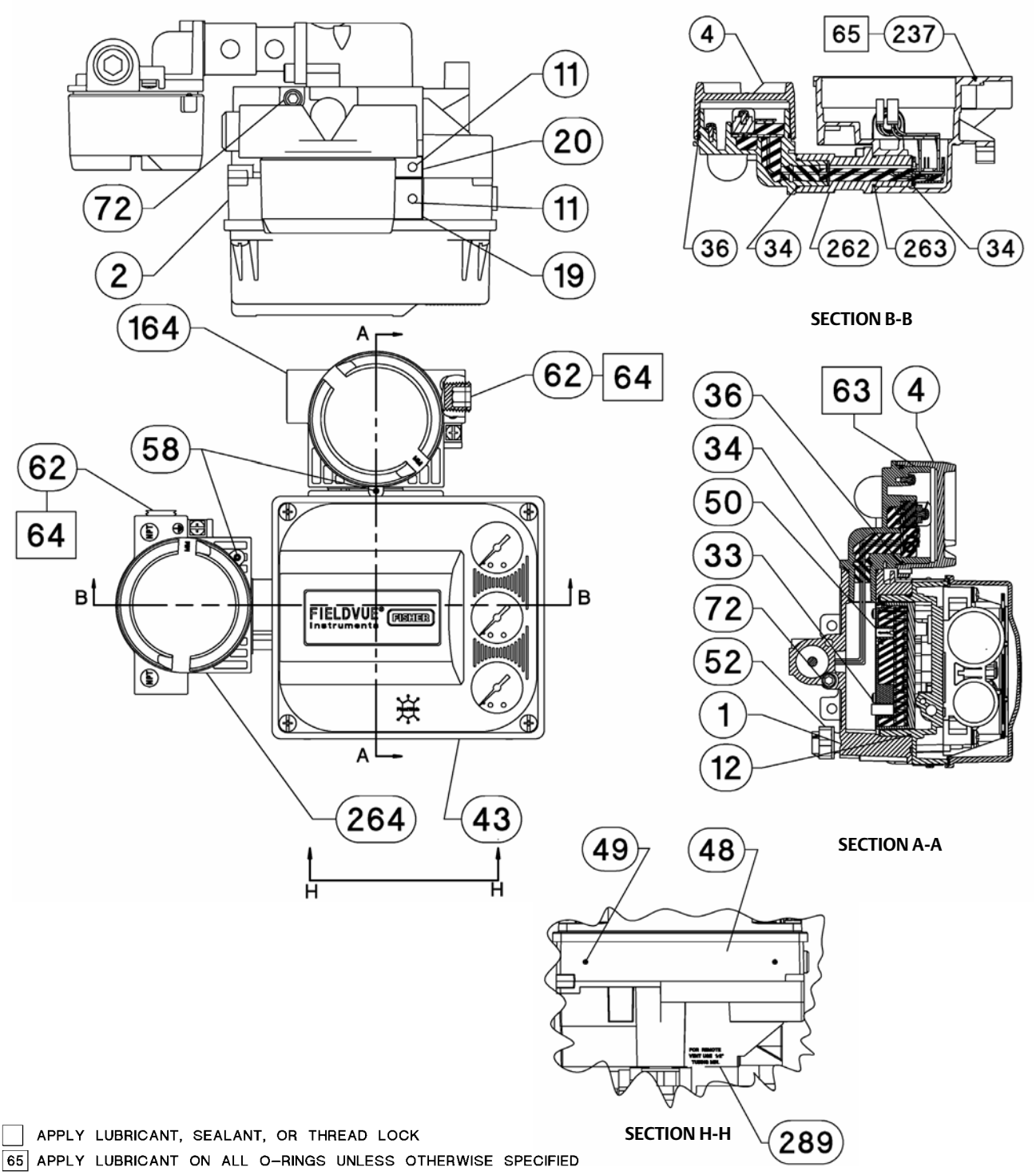
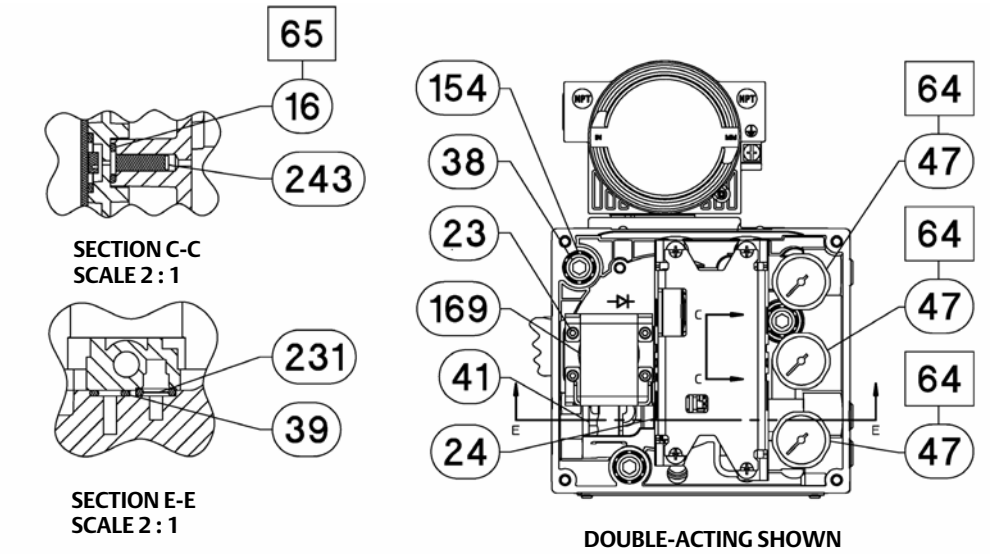
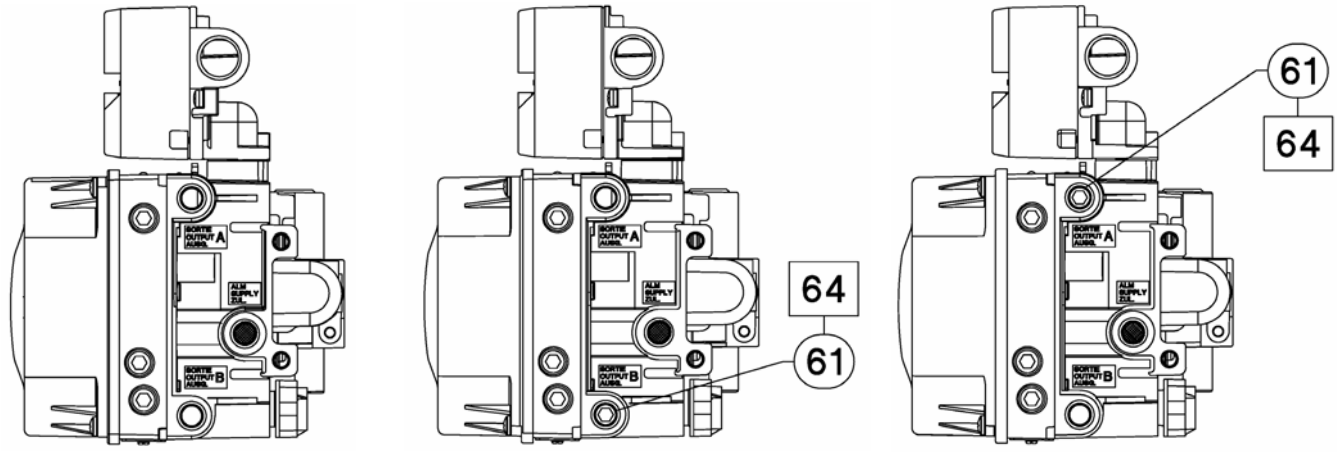


Figure 8-4. FIELDVUE DVC6205 Base Unit Housing Assembly (continued on next page)





DOUBLE-ACTING **DIRECT-ACTING** **REVERSE-ACTING**

☐ APPLY LUBRICANT, SEALANT, OR THREAD LOCK
65 APPLY LUBRICANT ON ALL O-RINGS UNLESS OTHERWISE SPECIFIED

GE40181

Figure 8-4. FIELDVUE DVC6205 Base Unit Housing Assembly (continued from previous page)

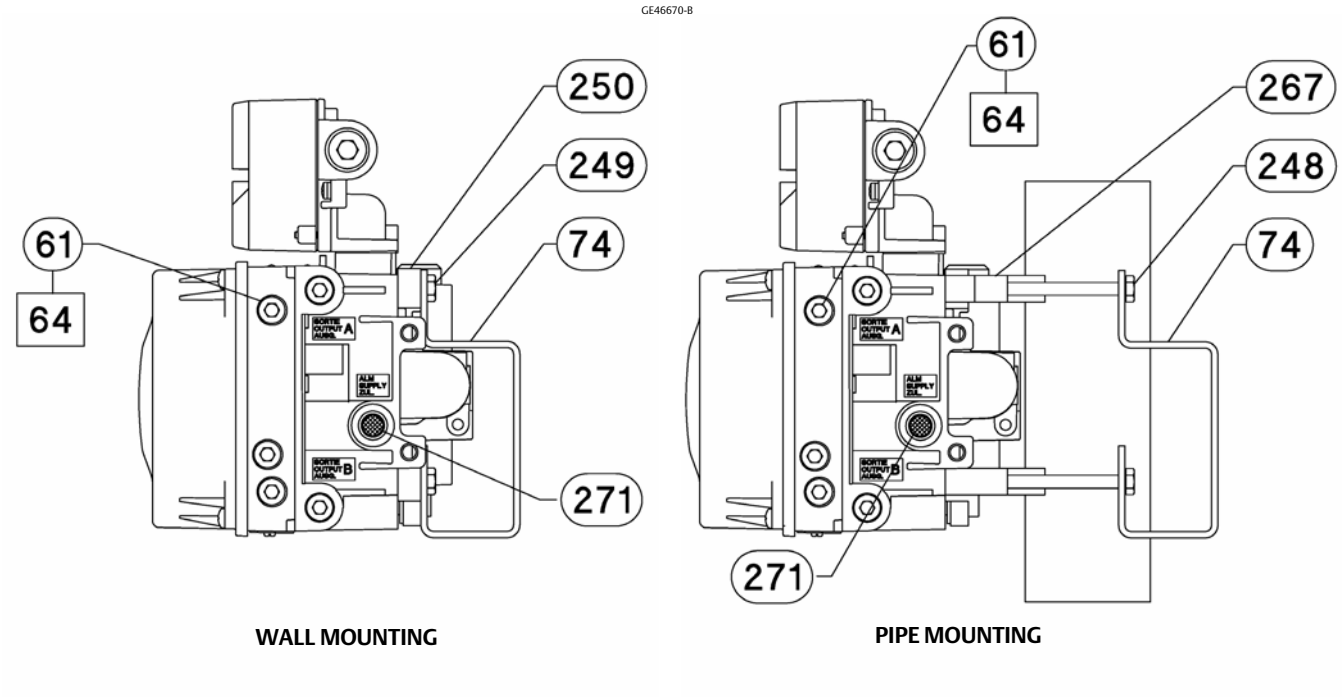
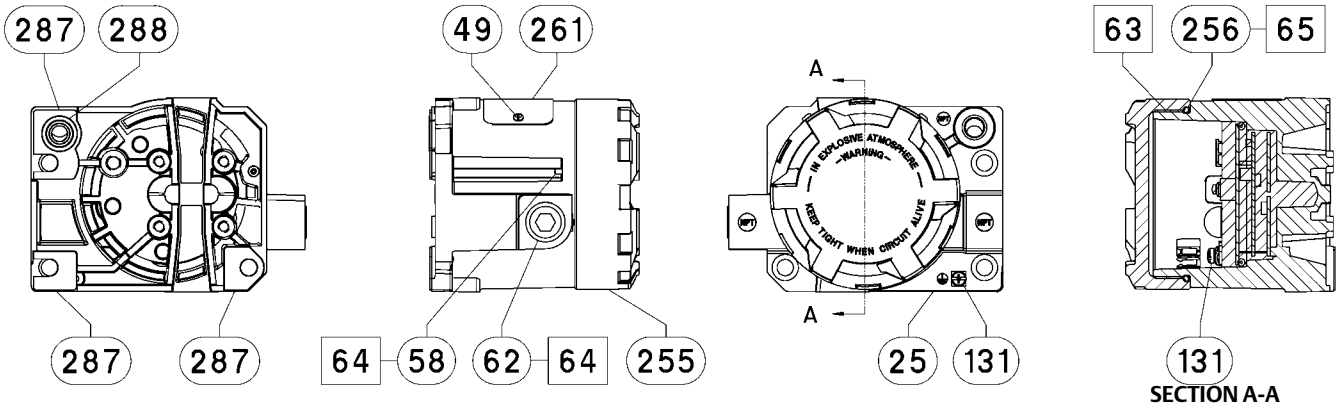


Figure 8-5. FIELDVUE DVC6215 Remote Feedback Assembly

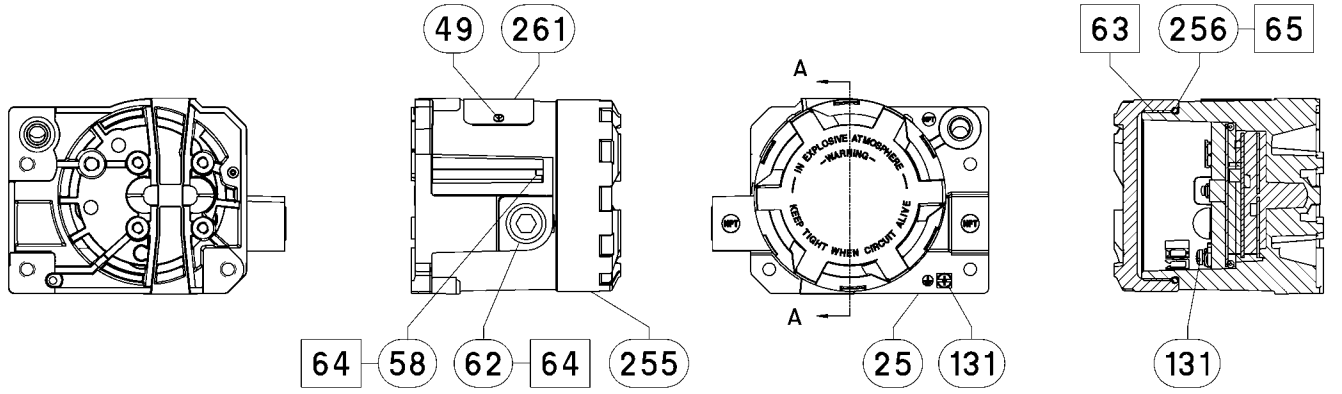


PARTS NOT SHOWN: 158

☐ APPLY LUBRICANT, SEALANT, OR THREAD LOCK

GE46670-B

HOUSING A
(USED FOR GX ACTUATOR)



PARTS NOT SHOWN: 158

☐ APPLY LUBRICANT, SEALANT, OR THREAD LOCK

GE40178-B

HOUSING B
(USED FOR ALL ACTUATORS EXCEPT GX)

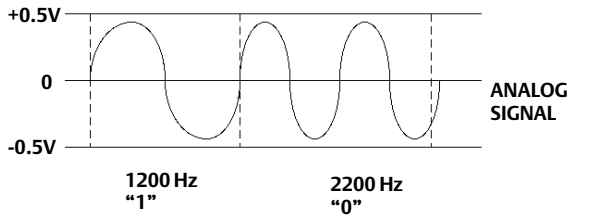
Appendix A Principle of Operation

HART Communication

The HART (Highway Addressable Remote Transducer) protocol gives field devices the capability of communicating instrument and process data digitally. This digital communication occurs over the same two-wire loop that provides the 4-20 mA process control signal, without disrupting the process signal. In this way, the analog process signal, with its faster update rate, can be used for control. At the same time, the HART protocol allows access to digital diagnostic, maintenance, and additional process data. The protocol provides total system integration via a host device.

The HART protocol uses frequency shift keying (FSK). Two individual frequencies of 1200 and 2200 Hz are superimposed over the 4-20 mA current signal. These frequencies represent the digits 1 and 0 (see figure A-1). By superimposing a frequency signal over the 4-20 mA current, digital communication is attained. The average value of the HART signal is zero, therefore no DC value is added to the 4-20 mA signal. Thus, true simultaneous communication is achieved without interrupting the process signal.

Figure A-1. HART Frequency Shift Keying Technique

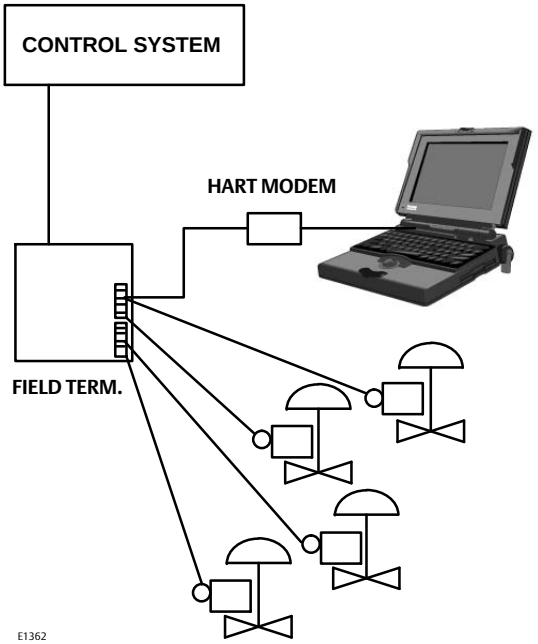


The HART protocol allows the capability of multidropping, i.e., networking several devices to a single communications line. This process is well suited for monitoring remote applications such as pipelines, custody transfer sites, and tank farms. See table 7-2 for instructions on changing the printed wiring board DIP switch configuration to multidrop.

DVC6200 Digital Valve Controller

The DVC6200 digital valve controller housing contains the travel sensor, terminal box, pneumatic input and output connections and a module base that may be easily replaced in the field without disconnecting field wiring or tubing. The module base contains the following submodules: I/P converter, printed wiring board (pwb) assembly, and pneumatic relay. The relay position is detected by sensing the magnet on the relay beam via a detector on the printed wiring board. This sensor is used for the minor loop feedback (MLFB) reading. The module base can be rebuilt by replacing the submodules. See figures A-3 and A-4.

Figure A-2. Typical FIELDVUE Instrument to Personal Computer Connections for ValveLink Software



DVC6200 digital valve controllers are loop-powered instruments that provide a control valve position proportional to an input signal from the control room. The following describes a double-acting digital valve controller mounted on a piston actuator.

The input signal is routed into the terminal box through a single twisted pair of wires and then to the printed wiring board assembly submodule where it is read by the microprocessor, processed by a digital algorithm, and converted into an analog I/P drive signal.

As the input signal increases, the drive signal to the I/P converter increases, increasing the I/P output pressure. The I/P output pressure is routed to the pneumatic relay submodule. The relay is also connected to supply pressure and amplifies the small pneumatic signal from the I/P converter. The relay accepts the amplified pneumatic signal and provides two output pressures. With increasing input (4 to 20 mA signal), the output A pressure always increases and the output B pressure decreases. The output A pressure is used for double-acting and single-acting direct applications. The output B pressure is used for double-acting and single-acting reverse applications. As shown in figure A-3 the increased output A pressure causes the actuator stem to move downward. Stem position is sensed by the non-contact travel feedback sensor. The stem continues to move downward until the correct stem position is attained. At this point the printed wiring board assembly stabilizes the I/P drive signal. This positions the flapper to prevent any further increase in nozzle pressure.

As the input signal decreases, the drive signal to the I/P converter submodule decreases, decreasing the I/P output pressure. The pneumatic relay decreases the output A pressure and increases the output B pressure. The stem moves upward until the correct position is attained. At this point the printed wiring board assembly stabilizes the I/P drive signal. This positions the flapper to prevent any further decrease in nozzle pressure.

Figure A-3. FIELDVUE DVC6200 Digital Valve Controller Block Diagram

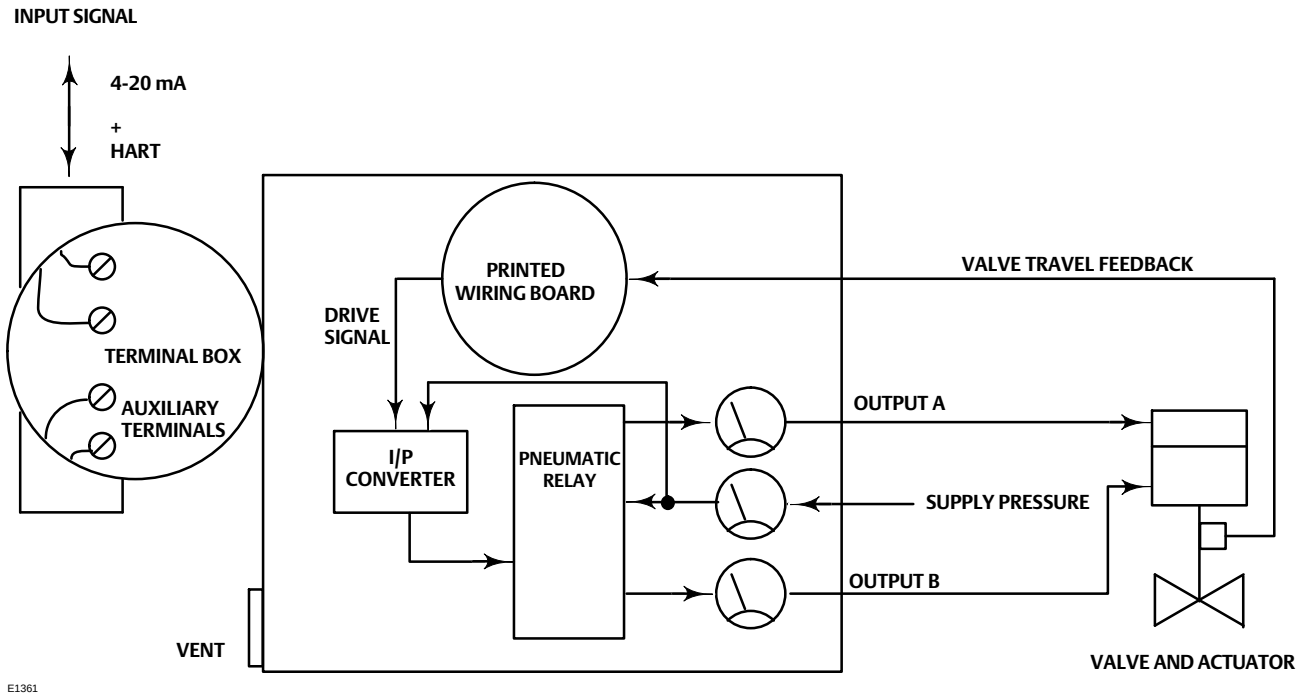
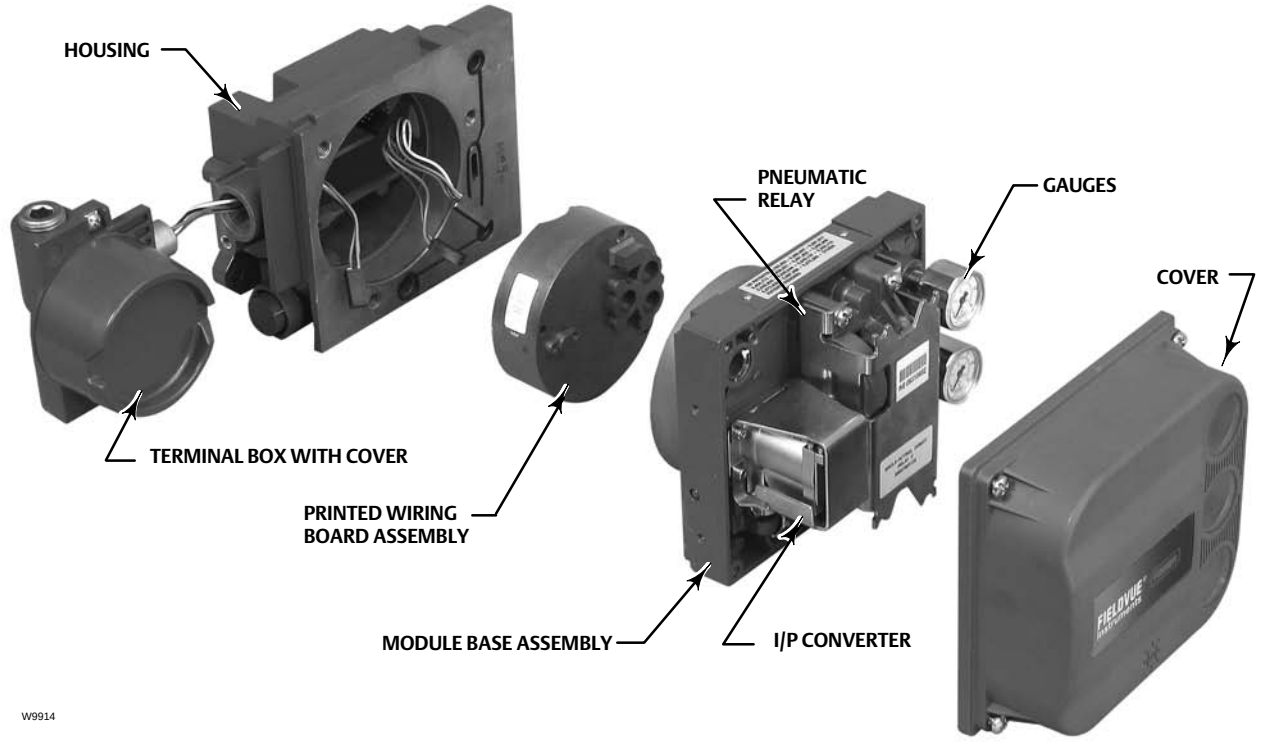


Figure A-4. FIELDVUE DVC6200 Digital Valve Controller Assembly



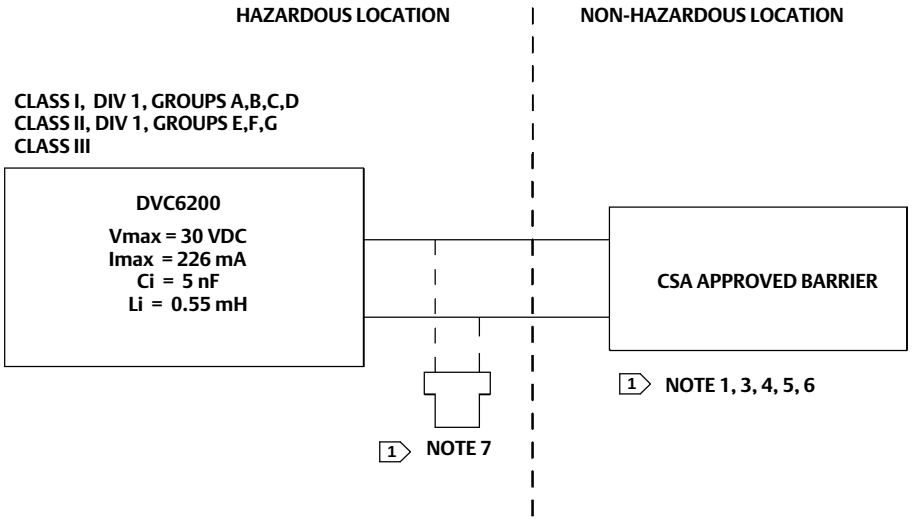
Appendix B Loop Schematics/Nameplates

This section includes loop schematics required for wiring of intrinsically safe installations and the approvals nameplates. If you have any questions, contact your Emerson Process Management sales office.

Note

These nameplates and schematics are only applicable to the DVC6200 digital valve controller. DVC6205 base unit and DVC6215 remote feedback unit approvals will be included when available.

Figure B-1. CSA Loop Schematic For FIELDVUE DVC6200



1 THE ENTITY CONCEPT ALLOWS INTERCONNECTION OF INTRINSICALLY SAFE APPARATUS TO ASSOCIATED APPARATUS NOT SPECIFICALLY EXAMINED IN SUCH COMBINATION. THE CRITERIA FOR INTERCONNECTION IS THAT THE VOLTAGE (Vmax or Ui), THE CURRENT (Imax or Ii), AND THE POWER (Pmax or Pi) OF THE INTRINSICALLY SAFE APPARATUS MUST BE EQUAL TO OR GREATER THAN THE VOLTAGE (Voc or Uo), AND THE CURRENT (Isc or Io), AND THE POWER (Po) DEFINED BY THE ASSOCIATED APPARATUS. IN ADDITION, THE SUM OF THE MAX UNPROTECTED CAPACITANCE (Ci) AND MAX UNPROTECTED INDUCTANCE (Li), INCLUDING THE INTERCONNECTING CABLING CAPACITANCE (Ccable) AND CABLING INDUCTANCE (Lcable) MUST BE LESS THAN THE ALLOWABLE CAPACITANCE (Ca) AND INDUCTANCE (La) DEFINED BY THE ASSOCIATED APPARATUS. IF THE ABOVE CRITERIA IS MET, THEN THE COMBINATION MAY BE CONNECTED.
Vmax or Ui $\geq$ Voc or Uo Imax or Ii $\geq$ Isc or Io Pmax or Pi $\geq$ Po Ci + Ccable $\leq$ Ca Li + Lcable $\leq$ La

3 INSTALLATION MUST BE IN ACCORDANCE WITH THE NATIONAL ELECTRICAL CODE (CEC) PART 1 AND ANSI/ISA RP12.6

4 MAXIMUM SAFE AREA VOLTAGE SHOULD NOT EXCEED 250 Vrms

5 RESISTANCE BETWEEN INTRINSICALLY SAFE GROUND AND EARTH GROUND MUST BE LESS THE ONE OHM

6 LOOPS MUST BE CONNECTED ACCORDING TO THE BARRIER MANUFACTURER'S INSTRUCTIONS.

7 IF HAND-HELD COMMUNICATOR OR MULTIPLEXER IS USED IT MUST BE CSA APPROVED WITH ENTITY PARAMETERS AND INSTALLED PER THE MANUFACTURER'S CONTROL DRAWING

GE42818 sheets 2 and 8

Figure B-2. CSA Nameplate for FIELDVUE DVC6200

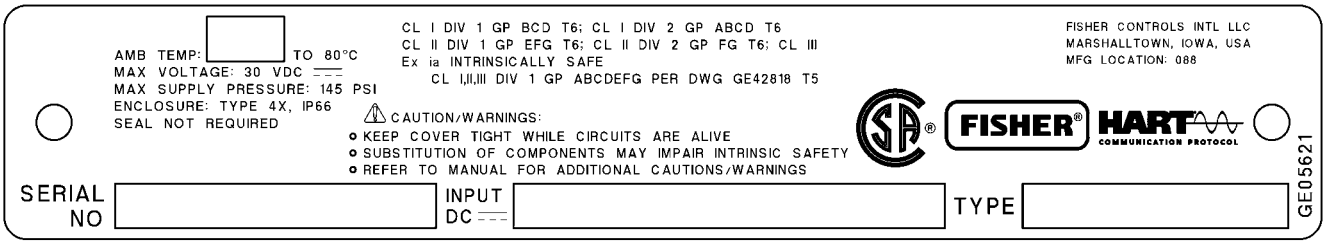
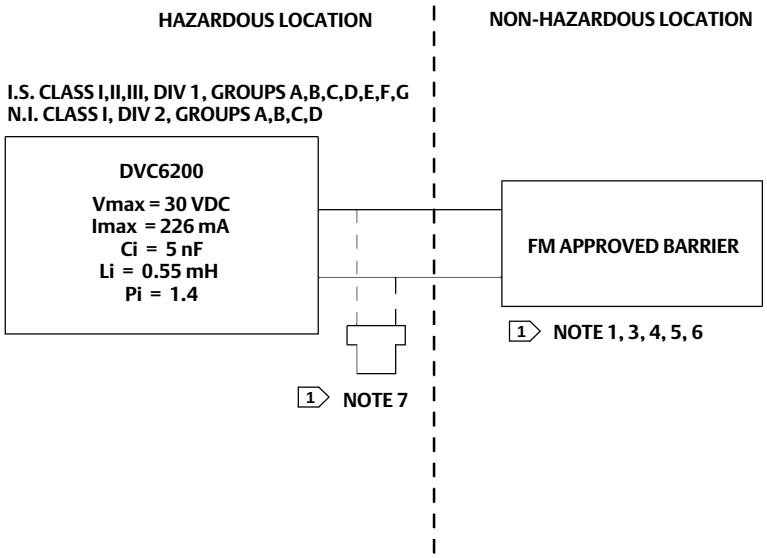

AMB TEMP: TO 80°C
MAX VOLTAGE: 30 VDC
MAX SUPPLY PRESSURE: 145 PSI
ENCLOSURE: TYPE 4X, IP66
SEAL NOT REQUIRED
CL I DIV 1 GP BCD T6; CL I DIV 2 GP ABCD T6
CL II DIV 1 GP EFG T6; CL II DIV 2 GP FG T6; CL III
Ex ia INTRINSICALLY SAFE
CL I,II,III DIV 1 GP ABCDEFG PER DWG GE42818 T5
CAUTION/WARNINGS:
KEEP COVER TIGHT WHILE CIRCUITS ARE ALIVE
SUBSTITUTION OF COMPONENTS MAY IMPAIR INTRINSIC SAFETY
REFER TO MANUAL FOR ADDITIONAL CAUTIONS/WARNINGS
FISHER CONTROLS INTL LLC
MARSHALLTOWN, IOWA, USA
MFG LOCATION: 088
FISHER
HART
COMMUNICATION PROTOCOL
SERIAL NO
INPUT DC
TYPE
GE05621

Figure B-3. FM Loop Schematic for FIELDVUE DVC6200



[1] THE ENTITY CONCEPT ALLOWS INTERCONNECTION OF INTRINSICALLY SAFE APPARATUS TO ASSOCIATED APPARATUS NOT SPECIFICALLY EXAMINED IN SUCH COMBINATION. THE CRITERIA FOR INTERCONNECTION IS THAT THE VOLTAGE (Vmax or Ui), THE CURRENT (Imax or Ii), AND THE POWER (Pmax or Pi) OF THE INTRINSICALLY SAFE APPARATUS MUST BE EQUAL TO OR GREATER THAN THE VOLTAGE (Voc or Uo), AND THE CURRENT (Isc or Io), AND THE POWER (Po) DEFINED BY THE ASSOCIATED APPARATUS. IN ADDITION, THE SUM OF THE MAX UNPROTECTED CAPACITANCE (Ci) AND MAX UNPROTECTED INDUCTANCE (Li), INCLUDING THE INTERCONNECTING CABLING CAPACITANCE (Ccable) AND CABLING INDUCTANCE (Lcable) MUST BE LESS THAN THE ALLOWABLE CAPACITANCE (Ca) AND INDUCTANCE (La) DEFINED BY THE ASSOCIATED APPARATUS. IF THE ABOVE CRITERIA IS MET, THEN THE COMBINATION MAY BE CONNECTED.
Vmax or Ui $\geq$ Voc or Uo Imax or Ii $\geq$ Isc or Io Pmax or Pi $\geq$ Po Ci + Ccable $\leq$ Ca Li + Lcable $\leq$ La

[3] INSTALLATION MUST BE IN ACCORDANCE WITH THE NATIONAL ELECTRICAL CODE (NEC) NFPA70 AND ANSI/ISA RP12.6.01

[4] MAXIMUM SAFE AREA VOLTAGE SHOULD NOT EXCEED 250 Vrms.

[5] RESISTANCE BETWEEN INTRINSICALLY SAFE GROUND AND EARTH GROUND MUST BE LESS THE ONE OHM

[6] LOOPS MUST BE CONNECTED ACCORDING TO THE BARRIER MANUFACTURER'S INSTRUCTION

[7] IF HAND-HELD COMMUNICATOR OR MULTIPLEXER IS USED IT MUST BE FM APPROVED WITH ENTITY PARAMETERS AND INSTALLED PER THE MANUFACTURER'S CONTROL DRAWING

GE42819 sheets 2 and 8

Figure B-4. FM Nameplate for FIELDVUE DVC6200

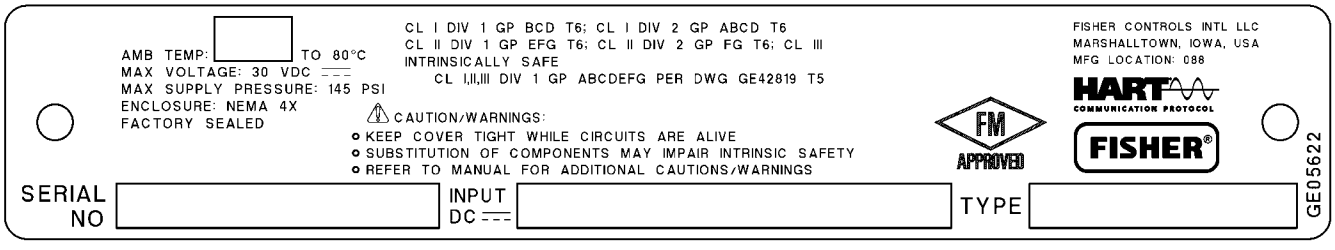

AMB TEMP: TO 80°C
MAX VOLTAGE: 30 VDC
MAX SUPPLY PRESSURE: 145 PSI
ENCLOSURE: NEMA 4X
FACTORY SEALED
CL I DIV 1 GP BCD T6; CL I DIV 2 GP ABCD T6
CL II DIV 1 GP EFG T6; CL II DIV 2 GP FG T6; CL III
INTRINSICALLY SAFE
CL I,II,III DIV 1 GP ABCDEFG PER DWG GE42819 T5
CAUTION/WARNINGS:
KEEP COVER TIGHT WHILE CIRCUITS ARE ALIVE
SUBSTITUTION OF COMPONENTS MAY IMPAIR INTRINSIC SAFETY
REFER TO MANUAL FOR ADDITIONAL CAUTIONS/WARNINGS
FM APPROVED
FISHER CONTROLS INTL LLC
MARSHALLTOWN, IOWA, USA
MFG LOCATION: 088
HART COMMUNICATION PROTOCOL
FISHER®
SERIAL NO
INPUT DC
TYPE
GE05622

Figure B-5. ATEX Intrinsically Safe, Dust Nameplate for FIELDVUE DVC6200

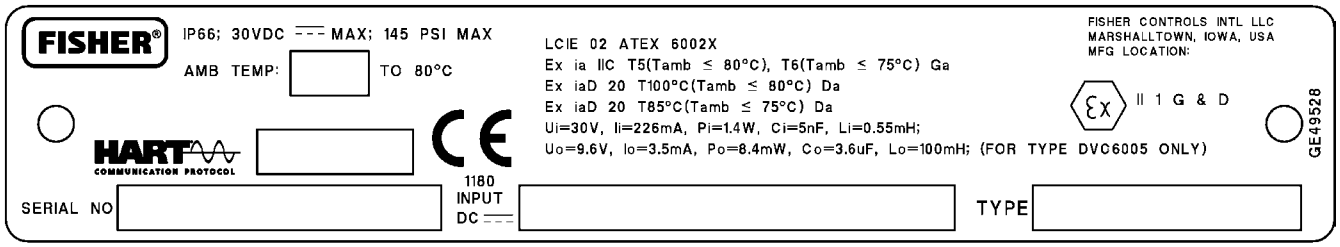


Figure B-6. ATEX Flameproof, Dust Nameplate for FIELDVUE DVC6200

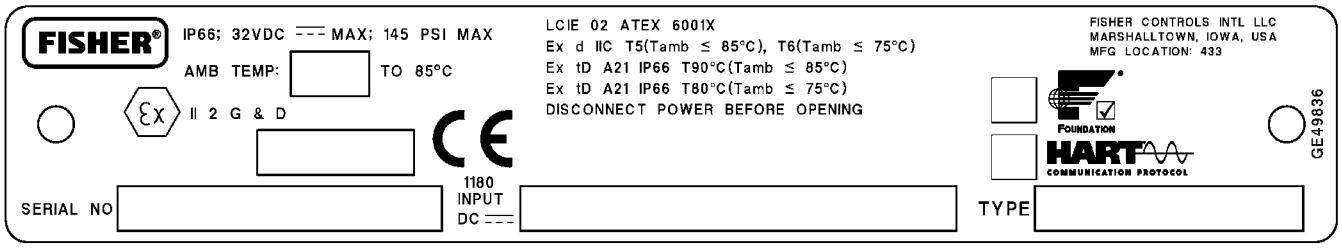


Figure B-7. ATEX Type n, Dust Nameplate for FIELDVUE DVC6200

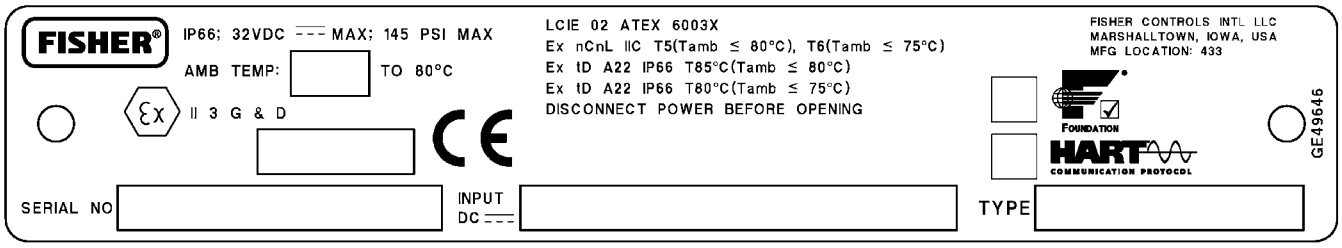
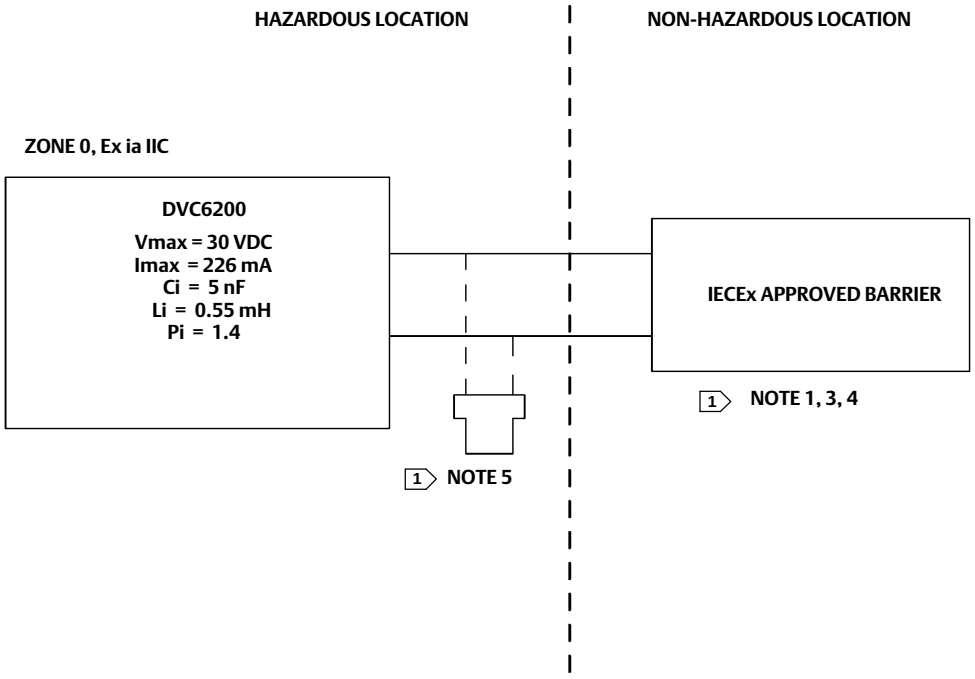


Figure B-8. IECEx Loop Schematic for FIELDVUE DVC6200



1 THE ENTITY CONCEPT ALLOWS INTERCONNECTION OF INTRINSICALLY SAFE APPARATUS TO ASSOCIATED APPARATUS NOT SPECIFICALLY EXAMINED IN SUCH COMBINATION. THE CRITERIA FOR INTERCONNECTION IS THAT THE VOLTAGE (Vmax or Ui), THE CURRENT (Imax or Ii), AND THE POWER (Pmax or Pi) OF THE INTRINSICALLY SAFE APPARATUS MUST BE EQUAL TO OR GREATER THAN THE VOLTAGE (Voc OR Uo), AND THE CURRENT (Isc or Io), AND THE POWER (Po) DEFINED BY THE ASSOCIATED APPARATUS. IN ADDITION, THE SUM OF THE MAX UNPROTECTED CAPACITANCE (Ci) AND MAX UNPROTECTED INDUCTANCE (Li), INCLUDING THE INTERCONNECTING CABLING CAPACITANCE (Ccable) AND CABLING INDUCTANCE (Lcable) MUST BE LESS THAN THE ALLOWABLE CAPACITANCE (Ca) AND INDUCTANCE (La) DEFINED BY THE ASSOCIATED APPARATUS. IF THE ABOVE CRITERIA IS MET, THEN THE COMBINATION MAY BE CONNECTED.
Vmax or Ui $\geq$ Voc or Uo Imax or Ii $\geq$ Isc or Io Pmax or Pi $\geq$ Po Ci + Ccable $\leq$ Ca Li + Lcable $\leq$ La

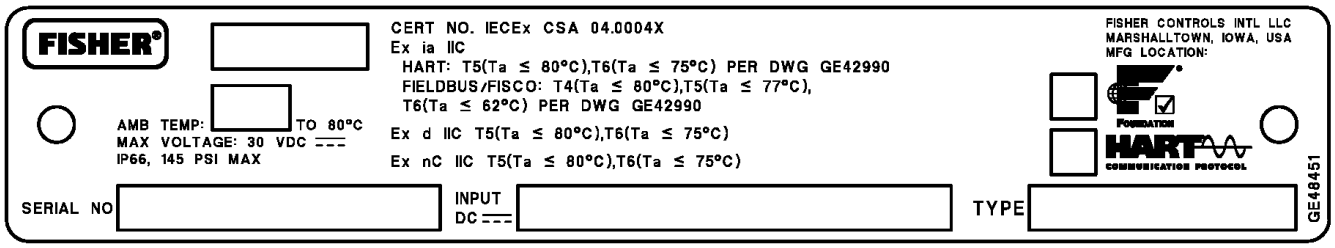
3 INSTALLATION MUST BE IN ACCORDANCE WITH THE NATIONAL WIRING PRACTICES OF THE COUNTRY IN USE

4 LOOPS MUST BE CONNECTED ACCORDING TO THE BARRIER MANUFACTURER'S INSTRUCTIONS

5 IF HAND-HELD COMMUNICATOR OR MULTIPLEXER IS USED IT MUST BE IECEx APPROVED WITH ENTITY PARAMETERS AND INSTALLED PER THE MANUFACTURERS CONTROL DRAWING

GE42990
Sheet 2 and 8 of 8

Figure B-9. IECEx Nameplate for FIELDVUE DVC6200



Appendix C Field Communicator Menu Trees

This section contains the Field Communicator menu trees for instrument level HC, AD, PD, and ODV and instrument level AC. It also contains Fast Key Sequence tables with coordinates to help locate the function/variable on the appropriate menu tree.

Instrument Level HC, AD, PD, and ODV

Function/Variable	Fast-Key Sequence	Coordinates(1)
Actuator Style	1-2-6-4	3-D
Alert Conditions	2-1	2-F
Alert Record Full Enable	1-2-3-6-2	10-H
	1-2-3-7-2	
Alert Record Not Empty Alert Enable	1-2-3-6-1	10-H
	1-2-3-7-1	
Analog Input	3-1	2-G
Analog Input Calibration	1-3-2-2	4-E
Analog Input Range Hi	1-2-5-3-1	6-H
Analog Input Range Lo	1-2-5-3-2	6-H
Analog Input Units	1-2-5-2-3	6-G
Auto Calibration	1-3-1-1	4-E
Autocalibration in Progress Enable	1-2-4-2-2	8-H
Auxiliary Input	3-6-1	4-H
	1-2-3-3-2-2(2)	12-D
	1-2-3-3-1-2(5)	
Auxiliary Terminal Alert Enable	1-2-3-3-2-1(2)	12-E
	1-2-3-3-1-1(5)	
Auxiliary Terminal Mode	1-2-3-3-2-3(2)	12-E
	1-2-3-3-1-3(5)	
	1-2-5-7	4-G
Burst Command	1-2-1-4-2	6-B
Burst Enable	1-2-1-4-1	6-B
Calibration in Progress Enab	1-2-4-2-1	8-I
Calibration Location	1-2-5-9-2	6-H
Clear Record	1-2-3-6-4	10-H
	1-2-3-7-4	
Command 3 (Trending) Pressure	1-2-1-4-3	5-A
Control Mode	Hot Key-2	1-A
	1-2-1-2	4-B
Critical NVM Shutdown	1-2-3-1-3-4	12-C
Cycle Count	1-2-3-5-1-2	12-H
	3-6-5	4-H
Cycle Count Alert Enable	1-2-3-5-1-1	12-H
Cycle Count Alert Point	1-2-3-5-1-3	12-H
Date	1-2-5-1-4	6-G
Dead Band (Cycle Count / Travel Accum)	1-2-3-5-2-1	12-H
Define Custom Characteristic	1-2-2-4	4-C
Descriptor	1-2-5-1-3	6-F
Device Description Information	3-8	2-G
Device ID	3-7-2	2-H
Device Revision	3-7-5	2-H
Diagnostic Data Available Enable	1-2-4-2-4	8-H
Diagnostic in Progress Enable	1-2-4-2-3	8-H
Display Record	1-2-3-6-3	10-H
	1-2-3-7-3	
Drive Current Shutdown	1-2-3-1-1	8-D
Drive Signal Alert Enable	1-2-3-1-2-1	10-D
Drive Signal	3-4	2-G
	1-2-3-1-2-2	10-D
Edit Feedback Connection	1-2-6-6	3-E
End Point Control Enable(3)	*1-2-2-2-5-1*	8-D
Failure Group Enable	1-2-3-6-5-1	10-I
	1-2-3-7-5-1	
Firmware Revision	3-7-6	2-H
Flash ROM Shutdown	1-2-3-1-3-5	12-C
Hardware Revision	3-7-7	2-H
HART Tag	1-2-5-1-1	6-F
	3-7-1	2-H
HART Universal Revision	3-7-9	2-H
Input Characterization	1-2-2-3	4-C
Instrument Date and Time	1-2-4-1-2	8-G
	1-2-5-8	4-G
Instrument Level	3-7-8	2-H
Instrument Mode	Hot Key-1	1-A
	1-2-1-1	4-B
Instrument Serial Number	1-2-5-1-6	6-G
Instrument Time Invalid Enable	1-2-4-1-1	8-G
Integral Dead Zone	1-2-4-4-4	8-I
	1-2-2-1-2-1	8-B
Integral Limit	1-2-4-4-3	8-I
	1-2-2-1-2-2	8-B
Integrator Saturated Hi Enable	1-2-4-4-1	8-I
Integrator Saturated Lo Enable	1-2-4-4-2	8-I
Lag Time(4)	1-2-2-5-3	5-D
Last Calibration Status	1-2-5-9-1	6-H
Lead/Lag(3)	*1-2-2-5-3*	5-D
Loop Current Validation Enable(2)	1-2-3-3-3	9-E
Low Power Write Fail Enable	1-2-3-1-3-2	12-B
Manual Calibration	1-3-1-2	4-E
Manufacturer—Instrument	3-7-3	2-H
Manufacturer—Actuator	1-2-6-1	3-D
Maximum Supply Pressure	1-2-5-6	4-G
Message	1-2-5-1-2	6-F
Miscellaneous Group Enable	1-2-3-6-5-3	10-I
	1-2-3-7-5-3	
Model	3-7-4	2-H
Multi-Drop Alert Enable	1-2-4-3-2	8-H
No Free Time Shutdown	1-2-3-1-3-6	12-C
Non-Critical NVM Alert Enable	1-2-3-1-3-3	12-C
Number of Power Ups	2-3-4	4-G
	3-6-9	4-H
Offline/Failed Alert Enable	1-2-3-1-3-1	12-B
Partial Stroke Test(3)	*2-5*	2-F
Partial Stroke Test Enable(3)	*1-2-7-1*	3-D

NOTE: *Italicized Fast-Key Sequence* indicates fast-key sequence is applicable only for instrument level ODV.
1. Coordinates are to help locate the item on the menu tree on page 134 and 135.
2. Instrument level AD, PD, and ODV only.
3. Instrument level ODV only.
4. Instrument level HC, AD, and PD only.
5. Instrument level HC only.

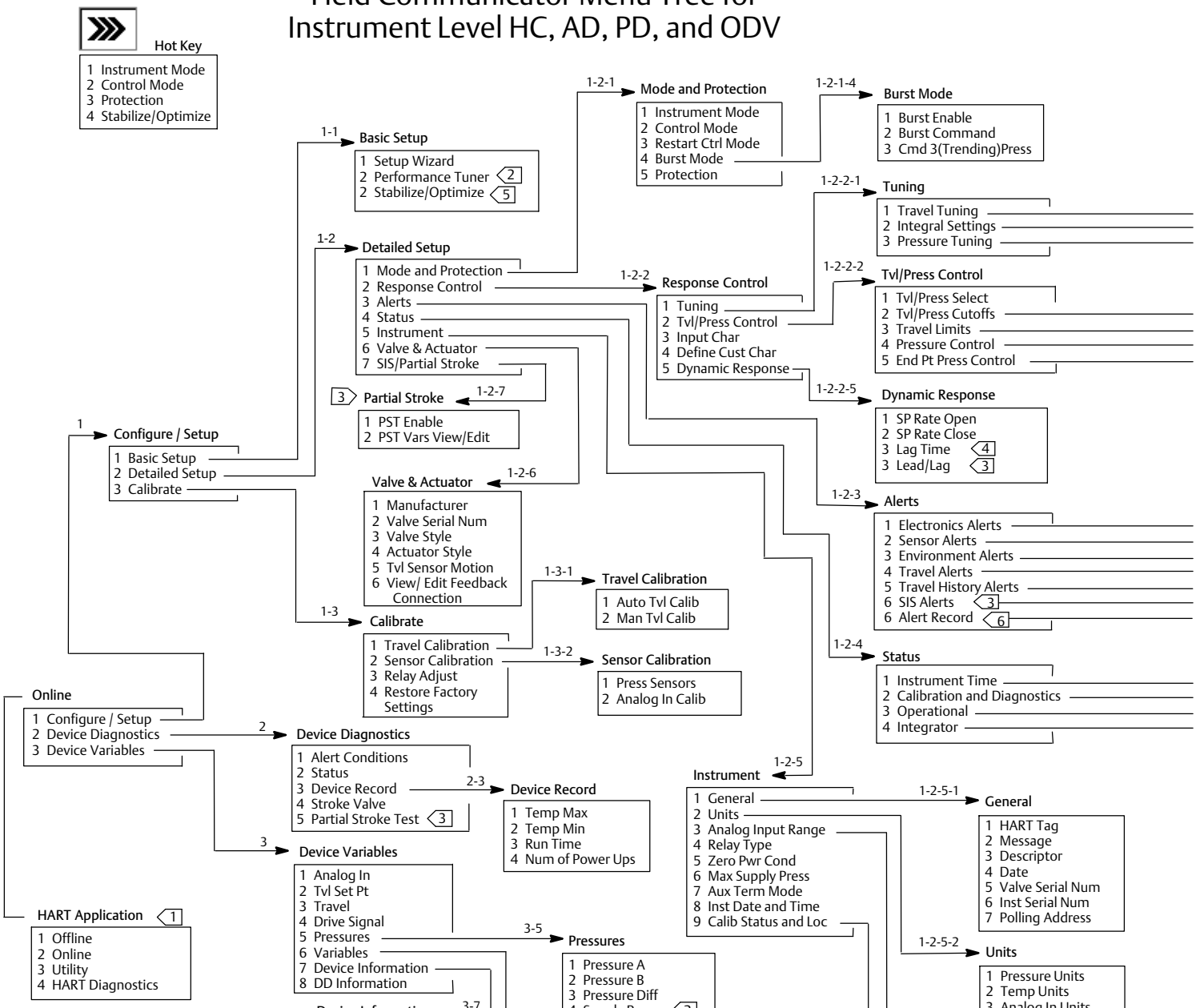
Continued on next page

Function/Variable	Fast-Key Sequence	Coordinates(1)
Partial Stroke Test Pressure Limit(3)	*1-2-3-6-1*	10-G
Partial Stroke Test Start Point(3)	*1-2-2-2-5-2*	8-D
Partial Stroke Test Variables View/Edit(3)	*1-2-7-2*	3-D
Performance Tuner(2)	1-1-2	2-B
	1-2-2-1-1-5	8-A
Polling Address	1-2-5-1-7	6-G
Pressure A	3-5-1	4-G
Pressure B	3-5-2	4-G
Pressure Control Active Enable	1-2-4-3-1	8-H
Pressure Deviation Alert Enable(3)	*1-2-3-6-2*	10-G
Pressure Deviation Alert Point(3)	*1-2-3-6-3*	10-G
Pressure Deviation Time(3)	*1-2-3-6-4*	10-G
Pressure Differential	3-5-3	4-G
Pressure Integral Control Enable	1-2-2-1-3-2	8-C
Pressure Integral Gain	1-2-2-1-3-3	8-C
Pressure MLFB Gain	1-2-2-1-3-1-3	10-B
Pressure Proportional Gain	1-2-2-1-3-1-2	10-B
Pressure Range Hi	1-2-2-2-4-1	10-D
Pressure Range Lo	1-2-2-2-4-2	10-D
Pressure Sat Time(3)	*1-2-2-2-5-4*	8-D
Pressure Sensor Shutdown(2)	1-2-3-2-3	12-C
Pressure Sensors—Calibration	1-3-2-1	4-E
Pressure Set Point(3)	*1-2-2-2-5-3*	8-D
Pressure Tuning Set	1-2-2-1-3-1-1	10-B
Pressure Units	1-2-5-2-1	6-G
Protection	Hot Key-3	1-A
	1-2-1-5	4-B
Raw Travel Input	3-6-7	4-H
Reference Voltage Shutdown	1-2-3-1-3-7	12-C
Relay Adjust	1-3-3	3-E
Relay Type	1-2-5-4	4-F
Restart Control Mode	1-2-1-3	4-B
Restore Factory Settings	1-3-4	3-E
Run Time	2-3-3	3-F
	3-6-8	4-H
Set Point Rate Close	1-2-2-5-2	5-D
Set Point Rate Open	1-2-2-5-1	5-D
Setup Wizard	1-1-1	2-B
Stabilize/Optimize	Hot Key-4	1-A
	1-1-2(5)	2-B
	1-2-2-1-1-4	8-A
Status	2-2	2-F
Stroke Valve	2-4	2-F
Supply Pressure(2)	3-5-4	4-G
	1-2-3-3-1-2	12-D
Supply Pressure Lo Alert Enable(2)	1-2-3-3-1-1	12-D
Supply Pressure Lo Alert Point(2)	1-2-3-3-1-3	12-D
Temperature	3-6-2	4-H
Temperature Maximum	3-6-3	4-H
	2-3-1	3-F

Function/Variable	Fast-Key Sequence	Coordinates(1)
Temperature Minimum	2-3-2	3-F
	3-6-4	4-H
Temperature Sensor Shutdown	1-2-3-2-2	12-C
Temperature Units	1-2-5-2-2	6-G
Travel	3-3	2-G
	1-2-3-4-1	9-E
Travel / Pressure Cutoff Hi	1-2-3-4-7-3	12-F
	1-2-2-2-2-1	10-B
Travel / Pressure Cutoff Lo	1-2-3-4-7-4	10-F
	1-2-2-2-2-2	10-B
Travel / Pressure Select	1-2-2-2-1	5-C
Travel Accumulator	3-6-6	4-H
	1-2-3-5-3-2	12-H
Travel Accumulator Alert Enable	1-2-3-5-3-1	12-H
Travel Accumulator Alert Point	1-2-3-5-3-3	12-I
Travel Alert Dead Band	1-2-3-4-3	9-E
Travel Alert Hi Enable	1-2-3-4-6-1	10-F
Travel Alert Hi Hi Enable	1-2-3-4-5-1	12-E
Travel Alert Hi Hi Point	1-2-3-4-5-3	12-F
Travel Alert Hi Point	1-2-3-4-6-3	10-F
Travel Alert Lo Enable	1-2-3-4-6-2	10-F
Travel Alert Lo Lo Enable	1-2-3-4-5-2	12-E
Travel Alert Lo Lo Point	1-2-3-4-5-4	12-F
Travel Alert Lo Point	1-2-3-4-6-4	10-F
Travel Deviation Alert Enable	1-2-3-4-4-1	10-E
Travel Deviation Alert Point	1-2-3-4-4-2	10-E
Travel Deviation Time	1-2-3-4-4-3	10-E
Travel Integral Control Enable	1-2-2-1-1-2	8-A
Travel Integral Gain	1-2-2-1-1-3	8-A
Travel Limit / Cutoff Hi Alert Enable	1-2-3-4-7-1	12-F
Travel Limit / Cutoff Lo Alert Enable	1-2-3-4-7-2	12-F
Travel Limit Hi	1-2-3-4-7-5	12-G
	1-2-2-2-3-1	10-C
Travel Limit Lo	1-2-3-4-7-6	12-G
	1-2-2-2-3-2	10-C
Travel MLFB Gain	1-2-2-1-1-1-4	10-A
Travel Proportional Gain	1-2-2-1-1-1-2	10-A
Travel Sensor Motion	1-2-6-5	3-E
Travel Sensor Shutdown	1-2-3-2-1	12-C
Travel Set Point	1-2-3-4-2	9-E
	3-2	2-G
Travel Tuning Set	1-2-2-1-1-1-1	10-A
Travel Velocity Gain	1-2-2-1-1-1-3	10-A
Valve Group Enable	1-2-3-6-5-2	10-I
	1-2-3-7-5-2	
Valve Serial Number	1-2-5-1-5	6-F
	1-2-6-2	3-D
Valve Style	1-2-6-3	3-D
Zero Power Condition	1-2-5-5	4-G

NOTE: *Italicized Fast-Key Sequence* indicates fast-key sequence is applicable only for instrument level ODV.
1. Coordinates are to help locate the item on the menu tree on page 134 and 135.
2. Instrument level AD, PD, and ODV only.
3. Instrument level ODV only.
4. Instrument level HC, AD, and PD only.
5. Instrument level HC only.

Field Communicator Menu Tree for Instrument Level HC, AD, PD, and ODV



Notes:

1-1-1 indicates fast-key sequence to reach menu

1 This menu is available by pressing the left arrow key from the previous menu.

2 Instrument level AD, PD, and ODV only.

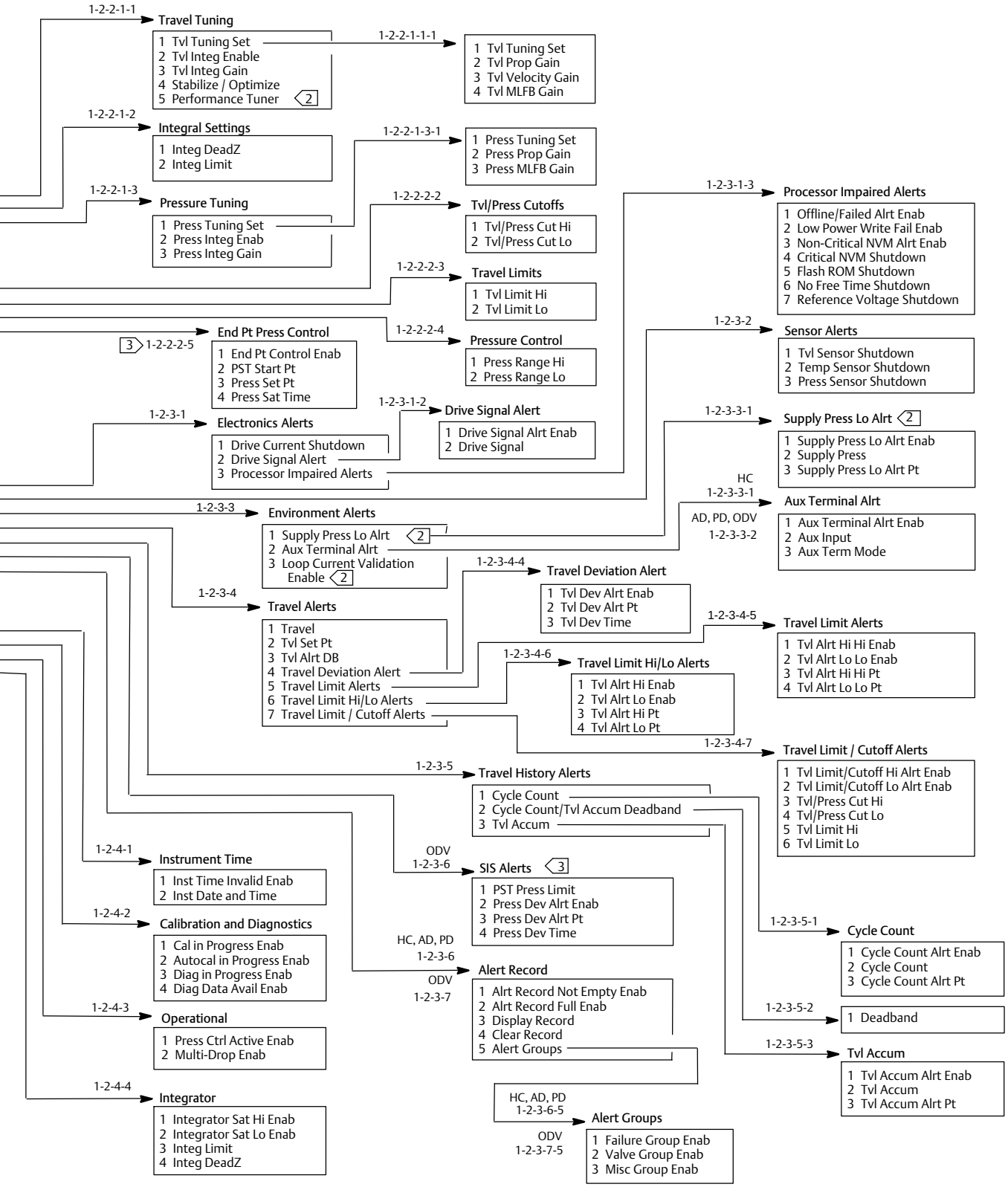
3 Instrument level ODV only.

4 Instrument level HC, AD, and PD only.

5 Instrument level HC only.

6 Fast key sequence for Alert Record with instrument level ODV is 1-2-3-7.

1 | 2 | 3 | 4 | 5 | 6

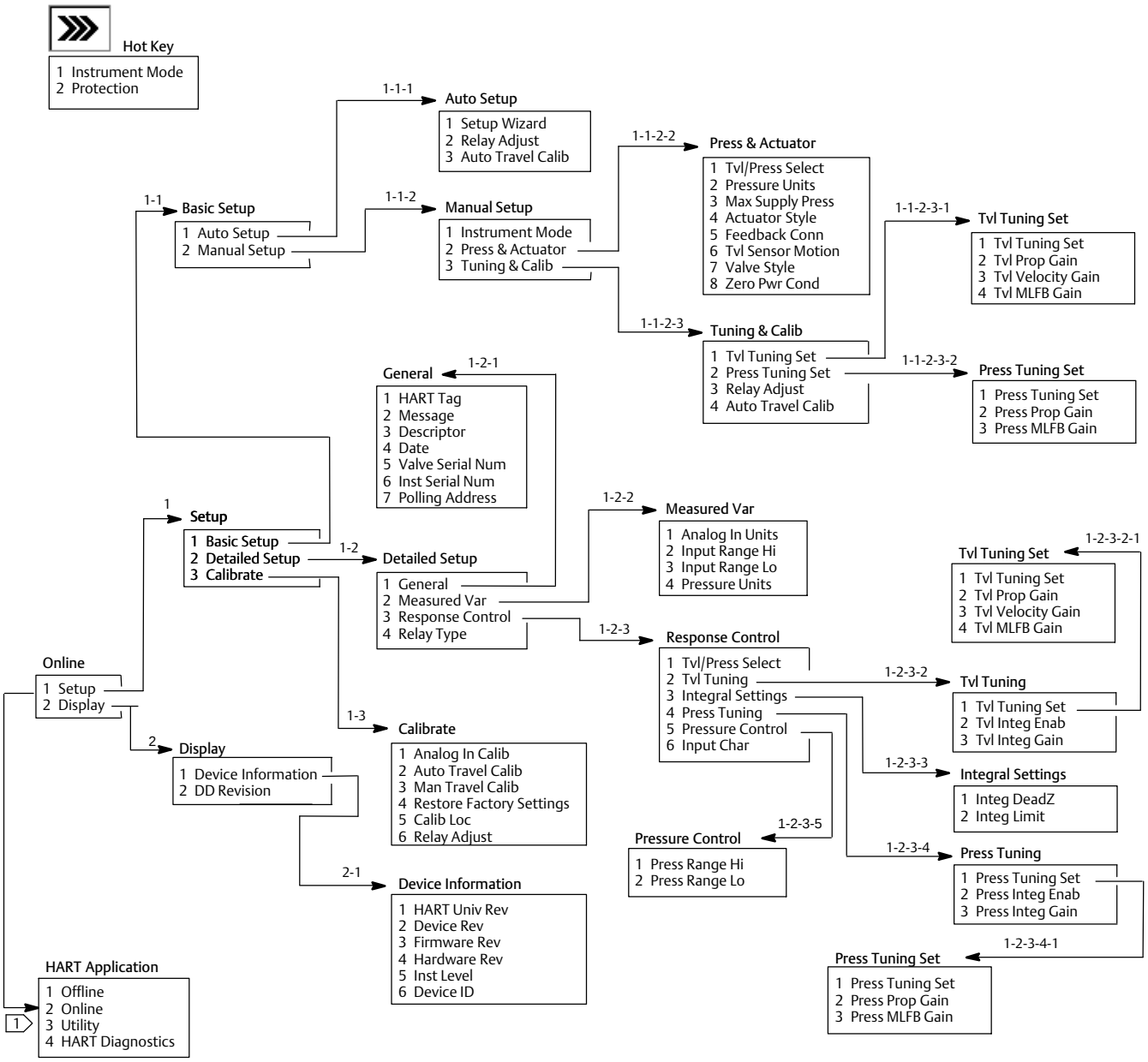

1-2-2-1-1
Travel Tuning
1 Tvl Tuning Set
2 Tvl Integ Enable
3 Tvl Integ Gain
4 Stabilize / Optimize
5 Performance Tuner 2
1-2-2-1-1-1
1 Tvl Tuning Set
2 Tvl Prop Gain
3 Tvl Velocity Gain
4 Tvl MLFB Gain
1-2-2-1-2
Integral Settings
1 Integ DeadZ
2 Integ Limit
1-2-2-1-3-1
1 Press Tuning Set
2 Press Prop Gain
3 Press MLFB Gain
1-2-2-1-3
Pressure Tuning
1 Press Tuning Set
2 Press Integ Enab
3 Press Integ Gain
1-2-2-2-2
Tvl/Press Cutoffs
1 Tvl/Press Cut Hi
2 Tvl/Press Cut Lo
1-2-2-2-3
Travel Limits
1 Tvl Limit Hi
2 Tvl Limit Lo
3 1-2-2-2-5
End Pt Press Control
1 End Pt Control Enab
2 PST Start Pt
3 Press Set Pt
4 Press Sat Time
1-2-2-2-4
Pressure Control
1 Press Range Hi
2 Press Range Lo
1-2-3-1
Electronics Alerts
1 Drive Current Shutdown
2 Drive Signal Alert
3 Processor Impaired Alerts
1-2-3-1-2
Drive Signal Alert
1 Drive Signal Alrt Enab
2 Drive Signal
1-2-3-1-3
Processor Impaired Alerts
1 Offline/Failed Alrt Enab
2 Low Power Write Fail Enab
3 Non-Critical NVM Alrt Enab
4 Critical NVM Shutdown
5 Flash ROM Shutdown
6 No Free Time Shutdown
7 Reference Voltage Shutdown
1-2-3-2
Sensor Alerts
1 Tvl Sensor Shutdown
2 Temp Sensor Shutdown
3 Press Sensor Shutdown
1-2-3-3
Environment Alerts
1 Supply Press Lo Alrt 2
2 Aux Terminal Alrt
3 Loop Current Validation Enable 2
1-2-3-3-1
Supply Press Lo Alrt 2
1 Supply Press Lo Alrt Enab
2 Supply Press
3 Supply Press Lo Alrt Pt
HC
1-2-3-3-1
AD, PD, ODV
1-2-3-3-2
Aux Terminal Alrt
1 Aux Terminal Alrt Enab
2 Aux Input
3 Aux Term Mode
1-2-3-4
Travel Alerts
1 Travel
2 Tvl Set Pt
3 Tvl Alrt DB
4 Travel Deviation Alert
5 Travel Limit Alerts
6 Travel Limit Hi/Lo Alerts
7 Travel Limit / Cutoff Alerts
1-2-3-4-4
Travel Deviation Alert
1 Tvl Dev Alrt Enab
2 Tvl Dev Alrt Pt
3 Tvl Dev Time
1-2-3-4-5
Travel Limit Alerts
1 Tvl Alrt Hi Hi Enab
2 Tvl Alrt Lo Lo Enab
3 Tvl Alrt Hi Pt
4 Tvl Alrt Lo Lo Pt
1-2-3-4-6
Travel Limit Hi/Lo Alerts
1 Tvl Alrt Hi Enab
2 Tvl Alrt Lo Enab
3 Tvl Alrt Hi Pt
4 Tvl Alrt Lo Pt
1-2-3-4-7
Travel Limit / Cutoff Alerts
1 Tvl Limit/Cutoff Hi Alrt Enab
2 Tvl Limit/Cutoff Lo Alrt Enab
3 Tvl/Press Cut Hi
4 Tvl/Press Cut Lo
5 Tvl Limit Hi
6 Tvl Limit Lo
1-2-3-5
Travel History Alerts
1 Cycle Count
2 Cycle Count/Tvl Accum Deadband
3 Tvl Accum
1-2-3-5-1
Cycle Count
1 Cycle Count Alrt Enab
2 Cycle Count
3 Cycle Count Alrt Pt
1-2-3-5-2
1 Deadband
1-2-3-5-3
Tvl Accum
1 Tvl Accum Alrt Enab
2 Tvl Accum
3 Tvl Accum Alrt Pt
1-2-4-1
Instrument Time
1 Inst Time Invalid Enab
2 Inst Date and Time
1-2-4-2
Calibration and Diagnostics
1 Cal in Progress Enab
2 Autocal in Progress Enab
3 Diag in Progress Enab
4 Diag Data Avail Enab
1-2-4-3
Operational
1 Press Ctrl Active Enab
2 Multi-Drop Enab
1-2-4-4
Integrator
1 Integrator Sat Hi Enab
2 Integrator Sat Lo Enab
3 Integ Limit
4 Integ DeadZ
ODV
1-2-3-6
SIS Alerts 3
1 PST Press Limit
2 Press Dev Alrt Enab
3 Press Dev Alrt Pt
4 Press Dev Time
HC, AD, PD
1-2-3-6
ODV
1-2-3-7
Alert Record
1 Alrt Record Not Empty Enab
2 Alrt Record Full Enab
3 Display Record
4 Clear Record
5 Alert Groups
HC, AD, PD
1-2-3-6-5
Alert Groups
ODV
1-2-3-7-5
1 Failure Group Enab
2 Valve Group Enab
3 Misc Group Enab

Instrument Level AC

Function/Variable	Fast-Key Sequence	Coordinates(1)
Actuator Style	1-1-2-2-4	4-C
Analog Input Calibration	1-3-1	3-F
Analog Input Range Hi	1-2-2-2	4-E
Analog Input Range Lo	1-2-2-3	4-E
Analog Input Units	1-2-2-1	4-E
Auto Travel Calibration	1-1-2-3-4	4-D
	1-3-2	3-F
	1-1-1-3	3-C
Calibration Location	1-3-5	3-G
Date	1-2-1-4	3-D
Descriptor	1-2-1-3	3-D
Device Description Revision	2-2	2-F
Device Identification	2-1-6	3-H
Device Revision	2-1-2	3-G
Feedback Connection	1-1-2-2-5	4-C
Firmware Revision	2-1-3	3-G
Hardware Revision	2-1-4	3-G
HART Tag	1-2-1-1	3-D
HART Universal Revision	2-1-1	3-G
Input Characterization	1-2-3-6	4-F
Instrument Level	2-1-5	3-H
Instrument Mode	Hot Key-1	1-B
	1-1-2-1	3-C
Instrument Serial Number	1-2-1-6	3-D
Integral Dead Zone	1-2-3-3-1	6-F
Integral Limit	1-2-3-3-2	6-F
Manual Travel Calibration	1-3-3	3-F
Maximum Supply Pressure	1-1-2-2-3	4-C
Message	1-2-1-2	3-D
Polling Address	1-2-1-7	3-E
Pressure Integral Control Enable	1-2-3-4-2	6-G
Pressure Integral Gain	1-2-3-4-3	6-G
Pressure MLFB Gain	1-1-2-3-2-3	6-D
	1-2-3-4-1-3	5-H
Pressure Proportional Gain	1-1-2-3-2-2	6-D
	1-2-3-4-1-2	5-H
Pressure Range Hi	1-2-3-5-1	4-G
Pressure Range Lo	1-2-3-5-2	4-G
Pressure Tuning Set	1-1-2-3-2-1	6-D
	1-2-3-4-1-1	6-G
Pressure Units	1-1-2-2-2	4-C
	1-2-2-4	4-E
Protection	Hot Key-2	1-B
Relay Adjust	1-1-1-2	3-B
	1-1-2-3-3	4-D
	1-3-6	3-G
Relay Type	1-2-4	3-E
Restore Factory Settings	1-3-4	3-F
Setup Wizard	1-1-1-1	3-D
Travel Integral Gain	1-2-3-2-3	6-F
Travel Integral Enable	1-2-3-2-2	6-F
Travel MLFB Gain	1-1-2-3-1-4	6-C
	1-2-3-2-1-4	6-E
Travel / Pressure Select	1-1-2-2-1	4-C
	1-2-3-1	4-F
Travel Proportional Gain	1-1-2-3-1-2	6-C
Travel Sensor Adjust	1-3-7	3-G
Travel Sensor Motion	1-1-2-2-6	4-C
Travel Tuning Set	1-1-2-3-1-1	6-C
	1-2-3-2-1-1	6-E
Travel Velocity Gain	1-1-2-3-1-3	6-C
	1-2-3-2-1-3	6-E
Valve Serial Number	1-2-1-5	3-D
Valve Style	1-1-2-2-7	4-C
Zero Power Condition	1-1-2-2-8	4-C

1. Coordinates are to help locate the item on the menu tree on page 137.

Field Communicator Menu Tree for Instrument Level AC



Notes:

1-1-1 indicates fast-key sequence to reach menu

1 This menu is available by pressing the left arrow key from the previous menu.

Glossary

Alert Point
An adjustable value that, when exceeded, activates an alert.

Algorithm
A set of logical steps to solve a problem or accomplish a task. A computer program contains one or more algorithms.

Alphanumeric
Consisting of letters and numbers.

Analog Input Units
Units in which the analog input is displayed and maintained in the instrument.

ANSI (acronym)
The acronym ANSI stands for the American National Standards Institute

ANSI Class
Valve pressure/temperature rating.

Auxiliary Input Alert
Checks the status of the auxiliary input; a discrete input. When enabled, the Auxiliary Input Alert is active when the auxiliary input terminals are open or closed (shorted), depending upon the selection for Auxiliary Input Alert State.

Auxiliary Terminal (Indicator)
Indicates whether auxiliary wiring terminals are open or closed (such as by an external switch contact).

Bench Set
Pressure, supplied to an actuator, required to drive the actuator through rated valve travel. Expressed in pounds per square inch.

Byte
A unit of binary digits (bits). A byte consists of eight bits.

Calibration Location
Where the instrument was last calibrated; either in the factory or in the field.

Configuration
Stored instructions and operating parameters for a FIELDVUE Instrument.

Control Loop
An arrangement of physical and electronic components for process control. The electronic components of the loop continuously measure one or more aspects of the process, then alter those aspects as necessary to achieve a desired process condition. A simple control loop measures only one variable. More sophisticated control loops measure many variables and maintain specified relationships among those variables.

Control Mode
Defines where the instrument reads its set point. The following control modes are available for a FIELDVUE Instrument:
Analog The instrument receives its travel set point over the 4-20 mA loop.
Digital The instrument receives its set point digitally, via the HART communications link.
Test This is not a user-selectable mode. The Field Communicator or ValveLink software places the instrument in this mode whenever it needs to move the valve, such as for calibration or diagnostic tests.

Control Mode, Restart
Determines the instrument control mode after a restart. See Control Mode for the available restart control modes.

Controller
A device that operates automatically to regulate a controlled variable.

Current-to-Pressure (I/P) Converter

An electronic component or device that converts a milliamp signal to a proportional pneumatic pressure output signal.

Cycle Counter

The capability of a FIELDVUE instrument to record the number of times the travel changes direction. The change in direction must occur after the deadband has been exceeded before it can be counted as a cycle.

Cycle Counter Alert

Checks the difference between the Cycle Counter and the Cycle Counter Alert Point. Cycle Counter Alert is active when the cycle counter value exceeds the Cycle Counter Alert Point. It clears after you reset the Cycle Counter to a value less than the alert point.

Cycle Counter Alert Point

An adjustable value which, when exceeded, activates the Cycle Counter Alert. Valid entries are 0 to 4 billion cycles.

Cycle Counter Deadband

Region around the travel reference point, in percent of ranged travel, established at the last increment of the Cycle Counter. The deadband must be exceeded before a change in travel can be counted as a cycle. Valid entries are 0% to 100%. Typical value is between 2% and 5%.

Deviation

Usually, the difference between set point and process variable. More generally, any departure from a desired or expected value or pattern.

Device ID

Unique identifier embedded in the instrument at the factory.

Device Revision

Revision number of the interface software that permits communication between the Field Communicator and the instrument.

Drive Signal

The signal to the I/P converter from the printed wiring board. It is the percentage of the total microprocessor effort needed to drive the valve fully open.

Drive Signal Alert

Checks the drive signal and calibrated travel. If one of the following conditions exists for more than 20 seconds, the Drive Signal Alert is active. If none of the conditions exist, the alert is cleared.
If Zero Power Condition = Closed

The alert is active when:

drive signal <10% and calibrated travel >3%

drive signal >90% and calibrated travel <97%

If Zero Power Condition = Open

The alert is active when:

drive signal <10% and calibrated travel <97%

drive signal >90% and calibrated travel >3%

Equal Percentage

A valve flow characteristic where equal increments of valve stem travel produce equal percentage changes in existing flow. One of the input characteristics available for a FIELDVUE Instrument. See also, Linear and Quick Opening.

Feedback Signal

Indicates to the instrument the actual position of the valve. The travel sensor provides the feedback signal to the instrument printed wiring board assembly.

Firmware Revision

The revision number of the instrument firmware. Firmware is a program that is entered into the instrument at time of manufacture and cannot be changed by the user.

Free Time

Percent of time that the microprocessor is idle. A typical value is 25%. The actual value depends on the number of functions in the instrument that are enabled and on the amount of communication currently in progress.

Full Ranged Travel

Current, in mA, that corresponds with the point where ranged travel is maximum, i.e., limited by the mechanical travel stops.

Gain
The ratio of output change to input change.

Hardware Revision
Revision number of the Fisher Controls instrument hardware. The physical components of the instrument are defined as the hardware.

HART (acronym)
The acronym HART stands for Highway Addressable Remote Transducer.

HART Tag
An eight-character name that identifies the physical instrument.

HART Universal Revision
Revision number of the HART Universal Commands which are the communications protocol for the instrument.

Input Characteristic
The relationship between the ranged travel and ranged input. Possible values include: linear, equal percentage, and quick opening.

Input Current
The current signal from the control system that serves as the analog input to the instrument. See also Input Signal.

Input Range
The analog input signal range that corresponds to the travel range.

Input Signal
The current signal from the control system. The input signal can be displayed in milliamperes or in percent of ranged input.

Instrument Level
Determines the functions available for the instrument. See table 6-2, page 93.

Instrument Mode
Determines if the instrument responds to its analog input signal. There are two instrument modes:
In Service: For a fully functioning instrument, the instrument output changes in response to analog input changes. Typically changes to setup or calibration cannot be made when the instrument mode is In Service.
Out of Service: The instrument output does not change in response to analog input changes when the instrument mode is Out of Service. Some setup parameters can be changed only when the instrument mode is Out of Service.

Instrument Protection
Determines if commands from a HART device can calibrate and/or configure certain parameters in the instrument. There are two types of instrument protection:
Configuration and Calibration: Prohibits changing protected setup parameters; prohibits calibration.
None: Permits both configuration and calibration. The instrument is "unprotected."

Instrument Serial Number
The serial number assigned to the printed wiring board by the factory but can be changed during setup. The instrument serial number should match the serial number on the instrument nameplate.

Leak Class
Defines the allowable leakage by a valve when it is closed. Leak class numbers are listed in two standards: ANSI/FCI 70-2 and IEC 534-4.

Linear
A valve flow characteristic where changes in flow rate are directly proportional to changes in valve stem travel. One of the input characteristics available for a FIELDVUE Instrument. See also, Equal Percentage and Quick Opening.

Linearity, dynamic
Linearity (independent) is the maximum deviation from a straight line best fit to the opening and closing curves and a line representing the average value of those curves.

Memory

A type of semiconductor used for storing programs or data. FIELDVUE instruments use three types of memory: Random Access Memory (RAM), Read Only Memory (ROM), and Non-Volatile Memory (NVM). See also these listings in this glossary.

Menu

A list of programs, commands, or other activities that you select by using the arrow keys to highlight the item then pressing ENTER, or by entering the numeric value of the menu item.

Minimum Closing Time

Minimum time, in seconds, for the travel to decrease through the entire ranged travel. This rate is applied to any travel decrease. Valid entries are 0 to 400 seconds. Deactivate by entering a value of 0 seconds.

Minimum Opening Time

Minimum time, in seconds, for the travel to increase through the entire ranged travel. This rate is applied to any travel increase. Because of friction, actual valve travel may not respond in exactly the same time frame. Valid entries are 0 to 400 seconds. Deactivate by entering a value of 0 seconds.

Non-Volatile Memory (NVM)

A type of semiconductor memory that retains its contents even though power is disconnected. NVM contents can be changed during configuration unlike ROM which can be changed only at time of instrument manufacture. NVM stores configuration restart data.

Parallel

Simultaneous: said of data transmission on two or more channels at the same time.

Polling Address

Address of the instrument. If the digital valve controller is used in a point-to-point configuration, set the polling address to 0. If it is used in a multidrop configuration, or split range application, set the polling address to a value from 0 to 15.

Pressure Sensor

A FIELDVUE instrument internal device that senses pneumatic pressure. The DVC6200 has three pressure sensors: one to sense supply pressure and two to sense the output pressures.

Primary Master

Masters are communicating devices. A primary master is a communicating device permanently wired to a field instrument. Typically, a HART-compatible control system or a computer running ValveLink software is the primary master.

In contrast, a secondary master is not often permanently wired to a field instrument. The Field Communicator or a computer running ValveLink software communicating through a HART modem could be considered a secondary master.

Note: If one type of master takes an instrument Out Of Service, the same type must put it In Service. For example, if a device set up as a primary master takes an instrument Out Of Service, a device set up as a primary master must be used to place the instrument In Service.

Quick Opening

A valve flow characteristic where most of the change in flow rate takes place for small amounts of stem travel from the closed position. The flow characteristic curve is basically linear through the first 40 percent of stem travel. One of the input characteristics available for a FIELDVUE Instrument. See also, Equal Percentage and Linear.

Random Access Memory (RAM)

A type of semiconductor memory that is normally used by the microprocessor during normal operation that permits rapid retrieval and storage of programs and data. See also Read Only Memory (ROM) and Non-Volatile Memory (NVM).

Rate

Amount of change in output proportional to the rate of change in input.

Read-Only Memory (ROM)

A memory in which information is stored at the time of instrument manufacture. You can examine but not change ROM contents.

Seat Load

Force exerted on the valve seat, typically expressed in pounds force per lineal inch of port circumference. Seat load is determined by shutoff requirements.

Set Point Filter Time

The time constant, in seconds, for the first-order input filter.

Software

Microprocessor or computer programs and routines that reside in alterable memory (usually RAM), as opposed to firmware, which consists of programs and routines that are programmed into memory (usually ROM) when the instrument is manufactured. Software can be manipulated during normal operation, firmware cannot.

Stroking Time

The time, in seconds, required to move the valve from its fully open position to fully closed, or vice versa.

Temperature Sensor

A device within the FIELDVUE instrument that measures the instrument's internal temperature.

Travel

Movement of the valve stem or shaft which changes the amount the valve is open or closed.

Travel Accumulator

The capability of a FIELDVUE instrument to record total change in travel. The value of the Travel Accumulator increments when the magnitude of the change exceeds the Travel Accumulator Deadband. To reset the Travel Accumulator, set it to zero.

Travel Accumulator Alert

Checks the difference between the Travel Accumulator value and the Travel Accumulator Alert Point. The Travel Accumulator Alert is active when the Travel Accumulator value exceeds the Travel Accumulator Alert Point. It clears after you reset the Travel Accumulator to a value less than the alert point.

Travel Accumulator Alert Point

An adjustable value which, when exceeded, activates the Travel Accumulator Alert. Valid entries are 0% to 4 billion %.

Travel Accumulator Deadband

Region around the travel reference point established at the last increment of the accumulator. This region must be exceeded before a change in travel can be accumulated. Valid entries are 0% to 100%.

Travel Alert

Checks the ranged travel against the travel high and low alert points. The travel alert is active if either the high or low point is exceeded. Once a high or low point is exceeded, the ranged travel must clear that point by the Travel Alert Deadband before the alert clears. Four travel alerts are available: Travel Alert Hi, Travel Alert Lo, Travel Alert Hi Hi, and Travel Alert Lo Lo.

Travel Alert Deadband

Travel, in percent of ranged travel, required to clear a travel alert, once it is active. Valid entries are -25% to 125%.

Travel Alert High Point

Value of the travel, in percent of ranged travel, which, when exceeded, sets the Travel Alert Hi alert. Valid entries are -25% to 125%.

Travel Alert High High Point

Value of the travel, in percent of ranged travel, which, when exceeded, sets the Travel Alert Hi Hi alert. Valid entries are -25% to 125%.

Travel Alert Low Point

Value of the travel, in percent of ranged travel, which, when exceeded, sets the Travel Alert Lo alert. Valid entries are -25% to 125%.

Travel Alert Low Low Point

Value of the travel, in percent of ranged travel, which, when exceeded, sets the Travel Alert Lo Lo alert. Valid entries are -25% to 125%.

Travel Cutoff

Defines the cutoff point for the travel, in percent of ranged travel. There are two travel cutoffs: high and low. Once travel exceeds the cutoff, the drive signal is set to either maximum or minimum, depending on the Zero Control Signal and if the cutoff is high or low. Minimum opening time or minimum closing time are not in effect while the travel is beyond the cutoff. Use the travel cutoff to obtain the desired seat load or to be sure the valve is fully open.

Travel Deviation

The difference between the analog input signal (in percent of ranged input), the “target” travel, and the actual “ranged” travel.

Travel Deviation Alert

Checks the difference between the target and the ranged travel. If the difference exceeds the Travel Deviation Alert Point for more than the Travel Deviation Time, the Travel Deviation Alert is active. It remains active until the difference is less than the Travel Deviation Alert Point.

Travel Deviation Alert Point

An adjustable value for the target travel and the ranged travel difference, expressed in percent, When this value is exceeded by the travel deviation for more than the Travel Deviation Time, the Travel Deviation Alert is active. Valid entries are 0% to 100%. Typically this is set to 5%.

Travel Deviation Time

The time, in seconds. that the travel deviation must exceed the Travel Deviation Alert Point before the alert is active. Valid entries are 1 to 60 seconds.

Travel Limit

A setup parameter that defines the maximum allowable travel (in percent of ranged travel) for the valve. During operation, the travel target will not exceed this limit. There are two travel limits: high and low. Typically the travel limit low will be used to keep the valve from going completely closed.

Travel Range

Travel, in percent of calibrated travel, that corresponds to the input range.

Travel Sensor

A device within the FIELDVUE instrument that senses valve stem or shaft movement. The travel sensor in the DVC6200 is the Hall Effect sensor that measures the position of the magnetic assembly.

Travel Sensor Motion

Increasing or decreasing air pressure causes the magnet assembly to move up or down or the rotary shaft to turn clockwise or counterclockwise. The Setup Wizard asks if it can move the valve to determine travel.

Tuning

The adjustment of control terms or parameter values to produce a desired control effect.

Tuning Set

Preset values that identify gain settings for a FIELDVUE instrument. The tuning set and supply pressure together determine an instrument's response to input signal changes.

Watch Dog Timer

A timer that the microprocessor must rearm periodically. If the microprocessor is unable to rearm the timer, the instrument goes through reset.

Zero Power Condition

The position of the valve (open or closed) when the electrical power to the instrument is removed. Zero Power Condition (ZPC) is determined by relay and actuator action as follows:

Single Acting Direct (Relay C) Upon loss of electrical power instrument goes to zero air output at port A.

Double Acting (Relay A) Upon loss of electrical power instrument goes to full supply air output at port B. A goes to zero air output.

Single Acting Reverse (Relay B) Upon loss of electrical power instrument goes to full supply air output at Port B.

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